

Contents—Dec. 1945

Volume XXVI

No. 12

ARCHIVES OF PHYSICAL MEDICINE

(Formerly Archives of Physical Therapy)

30 North Michigan Avenue, Chicago 2, Illinois

Original contributions, exchanges and books for review should be forwarded to the Editorial Office. All business matters including advertising should be handled through the Executive Office, 30 N. Michigan Ave., Chicago 2, Illinois. The statements in the manuscripts published in the ARCHIVES OF PHYSICAL MEDICINE are made solely on the responsibility of the author. The American Congress of Physical Medicine does not assume any responsibility for statements contained therein. Manuscripts accepted for publication in ARCHIVES OF PHYSICAL MEDICINE are for exclusive publication and may not be published elsewhere.

OFFICERS

American Congress of Physical Medicine

MILAND E. KNAPP, M.D.,
Minneapolis, President.
WALTER S. McCLELLAN, M.D.,
Saratoga Springs, N. Y.
President-Elect.
*H. WORLEY KENDELL, M.D.,
Brookhaven, Miss., First Vice-President.
*O. LEONARD HUDDLESTON, M.D.,
Denver, Colo., Second Vice-President.
EARL C. ELKINS, M.D.,
Rochester, Minn., Third Vice-President.
ARTHUR L. WATKINS, M.D.,
Boston, Fourth Vice-President.
ROBERT L. BENNETT, M.D.,
Warm Springs, Ga., Fifth Vice-President.
RICHARD KOVACS, M.D.,
New York, Secretary.
JOHN S. COULTER, M.D.,
Chicago, Treasurer.
WALTER J. ZEITER, M.D.,
Cleveland, Executive Director.
MARION G. SMITH, B.Sc.,
Chicago, Executive Secretary.

EXECUTIVE COUNCIL

Kristian G. Hansson, M.D., New York, Chairman.
*Norman E. Titus, M.D., Los Angeles, Secretary.
William Bierman, M.D., New York.
John S. Coulter, M.D., Chicago.
James C. Elsom, Madison, Wisconsin.
Frank H. Ewerhardt, M.D., St. Louis, Missouri.
Roy W. Fouts, M.D., Omaha, Nebraska.
John Severy Hibben, M.D., Pasadena, Calif.
Abraham R. Hollender, M.D., Chicago.
Disraeli Kobak, M.D., Chicago.
Frank H. Krusen, Rochester, Minnesota.
Fred B. Moor, M.D., Los Angeles.
Nathan H. Palmer, M.D., New Orleans.
William H. Schmidt, M.D., Philadelphia.
Frederick L. Wahrer, M.D., Marshalltown, Iowa.
Miland E. Knapp, M.D., Minneapolis, Ex-Officio.

EDITOR EMERITUS

DISRAELI KOBAK, M.D.,
Chicago.

* In Active Service.

Subscription — In the United States, its possessions, and Mexico, \$5.00 yearly; Canada, \$5.50; elsewhere, \$6.50 the year.
Advertising rates on application. All advertising copy subject to acceptance by publication committee.
Published monthly at Chicago, Illinois, by American Congress of Physical Medicine.
Entered as Second Class Matter, February 15, 1945, at the Post Office at Chicago, Illinois, under the Act of March 3, 1879.

ORIGINAL ARTICLES

- Work Therapy in an Army General Hospital. Capt.
Herman L. Rudolph, M.C., A.U.S. 741
- The Challenge of Crutches. IV. Prescribing Crutch
Gaits for Orthopedic Disabilities. George C.
Deaver, M.D., and Mary Eleanor Brown, M.A. 747
- New Uses of Procaine (Preliminary Communication).
Frederick M. Allen, M.D. 759
- Exercising Device for Increasing Joint Action. Comdr.
Louis B. Newman (MC) U.S.N.R. 762
- Stockinet-Adhesive Chest Strapping. Bert C. Wiley,
M.D. 764
- Physical Medicine in the Army Air Forces Convalescent
Hospital. Col. Howard A. Rusk, M.C.,
U.S.A., and Major Karl E. Voldeng, M.C., U.S.A. 766
- Support of Fingers and Thumb in Radial Nerve
Paralysis 770
- Editorials 771
- Medical News 773
- Book Reviews 776
- Physical Medicine Abstracts 778

INDEX

Volume XXVI, January-December, 1945, Inclusive..... 785

EDITOR OF THE MONTH

EARL C. ELKINS, M.D.

Rochester, Minn.

Complete Relaxation—

**RELIEF OF PAIN IN THE TREATMENT OF ARTHRITIS, RHEUMATISM,
NEURITIS, SCIATICA, PERIPHERAL NERVE INJURIES**



Write Today
for
Prices and Terms—
NOW



Can be conveniently obtained with the new
THERM-AIRE THERAPEUTIC TABLE

where warm, soothing stored heat from the specially constructed mattress conducts the heat by absorption to the body.

**A DEFINITE CONTRIBUTION
IN REESTABLISHING FUNCTIONAL
REHABILITATION**

Within twenty minutes you can produce mild diaphoresis, or when desired you can elevate the body temperature, thus accelerating metabolic processes.

A thirty day trial will convince you of its possibilities . . . Its low cost permits wide application.

PIONEER MANUFACTURERS OF THERMOTHERAPY EQUIPMENT

THERM-AIRE EQUIPMENT COMPANY

1220 North Fourth St., Nashville 7, Tenn.



**DIATHERMY
TUBES by
UNITED**

NO PRIORITY NECESSARY

You can now get the new tubes you have needed so badly to put your short wave diathermy machine in its best working order.

During the course of the war, electronic tubes remained on the critical list for the needs of radar, military radio, underwater sound, and other combat applications. This, of course, is why UNITED diathermy tubes have been very scarce ever since Pearl Harbor.

Your surgical supply house or radio parts jobber can now promptly supply UNITED diathermy tubes.



**UNITED ELECTRONICS
COMPANY**
NEWARK 2 • NEW JERSEY



"Made By Your Own Good Selves"

FROM his little hospital in a far corner of the world, the doctor wanted, as he put it, "equipment made by your own good selves." Too far away for quick service or spare parts, he needed performance he could count on. FISCHER apparatus and accessories are built with no weak links. The name FISCHER assures you of highest quality equipment.

AVAILABLE.— Full information regarding FISCHER apparatus, accessories, and supplies will be sent to physicians, hospitals, clinics, and other medical organizations—promptly on request.

H. G. FISCHER & CO.
2323-2345 Wabansia Avenue
CHICAGO 47, ILLINOIS

WORK THERAPY IN AN ARMY GENERAL HOSPITAL

CAPTAIN HERMAN L. RUDOLPH

Medical Corps, Army of the United States

The principles of work therapy are fairly well established. They stem from the recent trends and newer concepts of planned convalescence. The belief in rest as a curative factor as espoused by S. Weir Mitchell, Hugh Owen Thomas and Allen Krause is now giving way¹ to the principle of intensive activity as practiced in military hospitals and civilian rehabilitation centers.

Patients on discharge from a hospital should be able to resume their usual activities. There should be some practical measure to supplement medical opinion whereby a man can be declared fit for work or duty. Physical fitness tests could serve as criteria, but these are far from satisfactory. Men in different age groups cannot use the same standards, nor can men of the same age group but with varying body weights. Perhaps a simpler criterion is to subject a man to a work activity similar to that which was required prior to injury. With intensive activity, objective findings might present themselves for proper evaluation. In the absence of disabling findings, an opinion of fitness for work or duty might be supplemented by observation of the subject during a prescribed work and exercise regimen. In certain cases men might condition themselves to work and request return to work or duty.

Work, or industrial therapy, has gained much attention from those concerned with the recently instituted rehabilitation centers at Toronto, Ontario, Canada, and Boston. Storms,² of the Toronto center, has developed a unique system in industrial therapy. He demands that his occupational therapists familiarize themselves with the technics and tools of the various trades. Visits are made to industries, such as meat packing plants, foundries, machine shops and tanneries, where the therapists make a job analysis, securing for themselves a speaking knowledge of the work and materials. When the workman comes to the clinic for an initial interview, the therapist is able to speak his language and has a good grasp of the activity best for him. The bricklayer is put to work laying bricks, and when he can lay a thousand bricks a day he is ready to return to work; the sign painter with weakness of grip and shoulder muscles, unable to raise or lower his scaffold, is supplied with an overhead rope, a compound pulley and a weighted bag; the milkman who lifted 75-pound cans of milk fifty times daily is put to work lifting 75-pound bags of sand, and when he can do this fifty times daily he is ready for work. Storms argues that these activities may not be work therapy or occupational therapy in the conventional sense, but they do produce muscle. Muscle is produced only by exercise, and the best type of exercise is work therapy. It is flexible, it can be directed to particular joints and muscle groups, a new technic need not be learned if the old job is properly analyzed, and the patient is better able to watch progress and help decide on fitness.

Unfortunately, in civilian life there is the problem of "compensationitis" and in the army there is the occasional loss of morale which may be a potent deterrent factor in convalescence. One is reminded of the patient in the World War I who remarked to the physical therapist how dishearten-

1. Krusen, Frank H.: The Abuse of Rest as a Therapeutic Agent, *Proc. Staff Meet., Mayo Clin.* 20: 90 (March 21) 1945.

2. Storms, Harold D.: Rehabilitation of Convalescent Industrial Casualties with Physical Medicine, *Arch. Phys. Therapy* 25:469 (Aug.) 1944.

ing her work must be since she was trying to make patients well when none of them aimed to be well until the war was over. In the Army this is a problem in the province of the information and education branch.

Griffiths³ called attention to the fact that work therapy should be directed to restoration of the work-conditioned reflexes. He warned against the attempt to work too soon, because certain power reduction factors, the psychologic inhibitions, such as pain, fear of pain and fatigue, make a movement a conscious one and inhibit the desired action.

Coulter⁴ called attention to Roux's theory of functional adaptation, which states that a muscle develops only those characteristics which are necessary for the work it is called to do. A muscle can be trained to overcome great resistance and will develop power to do so, but this will not improve its endurance, which improves by its contracting against a small resistance over a long period. For example, a man can do 10 foot pounds of work by raising 10 pounds of weight 1 foot by flexing the elbow. He can do the same work raising 1 pound of weight 1 foot ten times. The first instance involves power; the second, endurance.

Another fundamental principle of exercise which should be kept in mind is the overload principle. Muscle is produced only by resistance. Except for a questionable mobilization of joints, activities such as passive motion and free-swinging exercises are valueless.

The intelligent application of work therapy in the Army hospital requires analyzing all jobs on the post and charting them. This has been well done by Hughens and Parker⁵ for a naval installation. We have adapted from this a similar chart depicting analyses of jobs which lend themselves readily to assignment as work therapy in an Army hospital. Certain jobs have specific activities which can be directed to particular joints and muscle groups. Others serve as general conditioners with general activity. In many jobs the activity can be graded from light to moderate to heavy.

Patients in this hospital who have graduated in the reconditioning program to class 3A, whose regimen of therapy has been outlined, who require specialist medical supervision no more than once weekly and who can be assigned to work therapy as an added therapeutic measure are transferred to the preconvalescent section. Most men well enough to go on furlough are well enough for work therapy, so that on return from furlough they are readmitted to the preconvalescent section.

When a man is admitted to the section he is interviewed by the non-commissioned officer in charge, who thoroughly orients him in reconditioning. The principles of work therapy are discussed; he is acquainted with the privileges of a class A pass, which entitles him to leave the hospital each evening; his clothing is secured for keeping in the ward, and he is issued a white uniform or fatigues to which is attached on the breast pocket a cloth tag identifying him as a patient. The next morning the patient, with his chart, roentgenograms and a card bearing his name, grade, ward, date of admission, referring section, branch of service and civilian occupation, is brought to the office of the chief reconditioning officer for another interview. At this time his condition is evaluated by a study of his record, his physical condition and his attitude. He is then issued a reconditioning record, which lists all activities in the reconditioning program and which is carried by the patient at all times. A job is prescribed and additional re-

3. Griffiths, H. E.: Treatment of the Injured Workman, *Lancet* 1:729 (June 12) 1943; cited by Coulter.⁴

4. Coulter, John S.: A Rehabilitation Center for the Injured Worker, *Arch. Phys. Therapy* 25:529 (Sept.) 1944.

5. Hughens, Hardy V., and Parker, Leon O.: Occupational Therapy in a Naval Hospital, *U. S. Nav. M. Bull.* 43:325 (Aug.) 1944.

conditioning activities are checked. The reconditioning record has a space for every day of the month, in which the officer or designated assistant responsible for an activity stamps attendance. At the time of the initial interview the secretaries in the physical therapy and occupational therapy sections pick up the names of those transferred to the preconvalescent section and alter appointments to the afternoon, thereby allowing a full morning to work therapy.

Other clinics, such as the dental and x-ray, likewise schedule appointments accordingly. Each ward maintains a wall roster board listing each patient and his work assignment. A fair number of patients are not assigned to work therapy because of a full schedule of intensive activity comprising physical therapy, occupational therapy, adaptive sports and educational classes. These are usually assigned to a short period of ward fatigue, maintaining ward police and sanitation.

Because of the continual turnover of patients it has been found advisable to assemble all men once weekly for repeated orientation. At this time Army Regulation 40-590, paragraph 2b(2) is read, which states in part:

By order of the Commanding Officer of the hospital and under the direction of the Commanding Officer of the detachment of patients, convalescent patients may be employed to perform such light duty in and about the hospital as may be of therapeutic value or which may tend to improve their physical condition.

All patients are impressed with the fact that work therapy is entirely a voluntary program, and they are invited to request retransfer to their original ward if it is not acceptable. Retransfer has not been requested during one year of operation; the several retransfers recorded were all due to infraction of rules. The principles of work therapy are discussed and all are given to understand the indebtedness of the hospital for their contribution in management. Rules and regulations are discussed in no uncertain terms and the severity of penalties is mentioned. Particular attention is paid to rules and regulations, because it is felt that more often than not infraction of rules is the result of an error of omission on the part of the ward officer. The vast majority of patients break rules unknowingly and will cooperate if oriented properly.

The necessity for full cooperation and participation in the reconditioning program is explained. The talk is followed by an open discussion of particular problems relating to furloughs, passes, clothing, pay, food, etc.

Experience has proved that a session of this sort is of great value to all concerned. It takes about one-half hour once weekly and in the long run saves much time. Offices are no longer interrupted by a continual procession of patients with the usual problems. Infraction of rules is just about a thing of the past. Participation in reconditioning is better in the preconvalescent section than anywhere else in the hospital, and the morale of the men is better. All appreciate the privilege of the class A pass, since many of them have families in the vicinity. Most of the men have the feeling of earning their salt by assisting in the function of the hospital, taking on an air of independence and renewed confidence. It has been gratifying to be accosted in the corridors of the hospital by patients requesting assistance in getting transferred to the preconvalescent section.

At 10:30 Saturday all patients are reviewed by the ward officers of the referring sections, the chief reconditioning officer, the ward administration officer, the assistant chief of the physical reconditioning branch and the noncommissioned officer in charge of the ten wards in the section. Reconditioning records are checked for attendance at the several activities in the reconditioning program, proper assignment of work detail is assured and

Office	Charge of quarters.....	X	X	XXX	XXX	X
	Clerical.....	X		XXX	XXX	X
	Typist.....	X		XXX	XXX	XXX
Messenger	Errands.....	XXX				
Athletics	Building and maintaining athletic facilities.....	X	XX			
Laboratory	Bottle washing, etc.....	X	XX			X
Laundry	Picking up and delivering.....	XX	XX			X
Central						
Supply	Folding gauze, etc.....					
Plaster Room	Making bandages.....			XXX	XXX	XXX
Utilities Shop	General work.....	X				XXX
Clothing						
Room	General work.....	X	X			
Library	General work.....	X	XXX	XX	XX	
Occupational						
Therapy	General work.....	X				X
Mess Halls	General work.....	X				
Photo Unit	General work.....	X				
Dent Clinic	General work.....	X	X			
Surgical						
Service	General work.....	X	XXX			
Brace Shop	General work.....	X				
Post Office	Sorting mail.....		XX		XXX XXX	X
Post						
Exchange	Pushing cart.....		XXX		XXX	
Medical						
Supply	Issue work.....		X		XXX	
Message						
Center	Sorting messages.....		XXX		XXX XXX	X

* X indicates a small amount; XX, a moderate amount, and XXX, a large amount.

progress of the medical condition of the patient is noted. Although patients are observed once weekly, sick call is held each morning. Those reporting ill are referred to the original ward officer and those requiring bed rest are transferred to the original wards.

Work therapy, a recent innovation, is no longer experimental. As with all innovations, certain problems and difficulties have arisen, largely owing to misconceptions of the purpose of the program. The following is an excerpt from War Department Training Manual 8-290:

Many types of activity of a work nature may be useful in the physical reconditioning of the patient or trainee. Some types of work therapy are used mostly for providing a fairly large amount of intense exercise. These are simply substitutes for other types of exercise. Others are used primarily because they contribute to the process of remedying specific disabilities.

Work Therapy should be carefully differentiated from ordinary ward or barracks fatigue. There is a certain amount of this which is assigned to the soldier at various times. This should not be looked upon as work therapy. Further, it should be carefully noted that the reconditioning companies should not be looked upon as labor battalions, or groups of people who happen to be useful for getting work done around the hospital. There is apt to be a temptation to use these people for this purpose regardless of the fact it is apt to contribute very little to their reconditioning.

To intelligently plan a project for work therapy, all of the different types of jobs around the hospital, or around the area where the reconditioning units are stationed, should be carefully surveyed for possible jobs to be done. Each of these jobs should be analyzed to determine what it can contribute in the line of therapy for any given type of disability. In assigning the job to the men, that should be the prime consideration, not what the man can do for the hospital.

In assigning this type of work therapy, it should not be used for more than two to two and a half hours a day for Class 3 or Class 2 patients, and it should not be used for more than one to one and a half hours a day for Class 1 patients. To utilize this type of activity for more than this, means time is being taken away from the ordinary reconditioning program of intensive exercise, and the recovery of the men is delayed.

Most work therapy projects are not good general conditioners. This will be readily understood when it is recalled that the ordinary carpenter, plumber, garage mechanic, and day laborer upon induction into the army are usually not in good physical condition, and need to be conditioned. Hence, there is no reason to believe that this type of work will recondition a patient. If it does not make a contribution to the specific disability, it is probably not worth undertaking.

Many other types of work therapy will suggest themselves to individuals making careful surveys of the opportunity. It should be reiterated, however, that these jobs should be assigned only when they benefit the man, not just when the man can do a job of work. The tendency is for a clerical assistant to be assigned because he is already a good typist and a good clerical assistant. Those men sit around and accomplish little in the line of reconditioning. The man who could best be assigned for the clerical assistant would be the man who had a finger injury so that it is difficult for him to write or type, but where this activity was good for his finger disability.

Where the hospital has an occupational therapist, she should be consulted in the formulation of these projects.

One ward of the preconvalescent section has been designated as a hand ward for which work therapy is not prescribed because of an all day intensive activity program comprising occupational therapy, physical therapy and adaptive and competitive sports. A report of this activity will be made in the near future.

Work by patients in the hospitals must be justified on a therapeutic basis. All concerned are alert to prevent degeneration of this activity into a subsidiary police and personnel section. Consideration is given in certain emergencies when manpower is urgently required, but assurance is secured for a brief and temporary utilization. Requests for the assignment of certain patients who are considered to be more familiar with specific jobs are generally ignored, since they smack of favoritism and may be resented by other patients. There are few jobs in the hospital that cannot be learned quickly.

Furthermore, undue familiarity between ward and preconvalescent patients is probably not conducive to productivity.

It is recognized that most jobs throughout the hospital are not good reconditioning agents, so that all patients are required to participate in the exercise periods twice daily, as do all patients throughout the hospital. It is mandatory that all preconvalescent patients attend the afternoon educational reconditioning hour. For the majority, physical therapy and functional occupational therapy, are prescribed. Many are assigned to the gymnasium for remedial exercises and adaptive sports.

One might think that there would be a tendency to hold some patients longer than necessary because of their reputation as good workers. This is rigorously controlled by repeated check on hospital days and repeated emphasis on rapid disposition of patients through channels for completion of class 2 and 1 reconditioning.

In conclusion, there can be no doubt that with tolerant and understanding supervision a work therapy program in the army general hospital can be of value in the treatment of patients, physically and mentally. This requires the studied cooperation and active interest of all concerned.

THE CHALLENGE OF CRUTCHES

IV. Prescribing Crutch Gaits for Orthopedic Disabilities

GEORGE G. DEAVER, M.D.

Medical Director, Institute for Crippled and Disabled

and

MARY ELEANOR BROWN, M.A.

Physical Therapy Technician, Institute for Crippled and Disabled

NEW YORK

A common question put to those teaching orthopedic rehabilitation is "How do you decide which crutch gait to teach to a particular disabled person?" The fitting of crutch gaits to disabilities has so far not been studied. The present scheme is offered as a practical key, and instructions for its use will be outlined.

Certain information is necessary before the actual prescription can be made.

A. Data for Crutch Gait Prescriptions

Before crutch gaits can be prescribed for orthopedic disabilities the following questions must be answered:

1. What is meant by orthopedic disability?
2. Under what circumstances are crutches necessary?
3. On what basis is the prescription of crutch gaits made?

These three questions will be discussed under the following headings: (1) The Meaning of Orthopedic Disability, (2) When Crutches Are Necessary and (3) The Basis for Prescribing Crutch Gaits.

1. The Meaning of Orthopedic Disability

In rehabilitating persons with orthopedic diseases, it is necessary to distinguish between the pathology, the etiology, the diagnosis and the disability. The pathology is the abnormal physiology of a particular tissue. The etiology is the cause. The diagnosis is the name of the disease. The disability is the manifestation of the pathology in terms of loss of movement and/or strength in a certain part or parts of the body.

For example, in the case of the late great president of the United States, Franklin Delano Roosevelt, the pathology was in the central nervous system (brain and spinal cord), the etiology was a filtrable virus, the diagnosis was poliomyelitis (infantile paralysis) and the disability was reported to be flaccid paraplegia, which means that the lower extremities are left weak or powerless.

Disabilities vary according to the site and extent of the pathologies. A disease does not always have a characteristic disability. For example, paraplegia can result from any of the following diseases: cerebral palsy, poliomyelitis, spina bifida or multiple sclerosis. The reason for this is that the disability resulting from a disease is dependent not only on the site and extent of the pathology but also on the part or parts of the body influenced by the pathologic tissue. Because of the continuous structure of the human body, one part of the body is influenced by many different tissues. Therefore, one part of the body may be disabled if any one of a number of tissues affecting it becomes pathologic. Furthermore, the disability may be far away from the site of the pathology; this is notably true in the case of pathology in the neuromuscular system. Those disabilities requiring crutches occur mainly in the extremities.

Table 1 gives the pathology, etiology, diagnosis and common disabilities of some principal orthopedic-disability-producing diseases which may necessitate the use of crutches.

After the acute stage of the disease the disabilities—and not the pathologies, etiologies or diagnoses—become the concern of rehabilitation therapists. In the following discussion the disability is the basis for the selection of the crutch gait. We shall be concerned with determining how good the disabled parts are with respect to performing activities involved in the use of crutches for locomotion, quite apart from whether the disability had its pathology in the brain, in the spinal cord or in a muscle, or whether its etiology was an infection, an unknown factor such as causes tumors or a fall from a 40-foot pole.

2. When Crutches Are Necessary

When a normal person walks, he supports the body weight on one limb while the other takes a step forward, after which he transfers the body weight to the part that has been advanced. He repeats the procedure and distance is covered. It is evident that during a certain period in every step it is necessary to support the total body weight on each lower extremity. If the body weight cannot be supported by the lower extremities unaided, braces, crutches or, if a part is missing, an artificial limb must be added.

A subject needs crutches when it is impossible or inadvisable for him to use his lower extremities, unbraced or braced, for total weight bearing or when his balance is not secure enough for him to walk unaided. In cases of injury or disease when total weight bearing might be painful or dangerous, it is the doctor who makes the decision as to whether or not crutches are necessary. When there is no pain or danger involved, it is fitting for the therapist to suggest crutches for those subjects whose balance, posture,

strength and walking might be improved through their use. Crutches should also be recommended when a subject walks in a labored fashion and greater speed is desired.

If one lower extremity is disabled so that total weight bearing is impossible or inadvisable, the subject may hop on the other extremity. This is not only obviously unstable and slow but also requires the disabled extremity to be held bent in some fashion in order to keep it from dragging

TABLE 1.—PRINCIPAL ORTHOPEDIC-DISABILITY-PRODUCING DISEASES NECESSITATING CRUTCHES.*

Pathology	Etiology	Diagnosis	Common Disabilities
In bones	Trauma	Fractures	Stiff joints
	Tuberculosis bacillus	Tuberculosis	Stiff joints
In joints	Infection	Arthritis	Stiff joints
	Tuberculosis bacillus	Tuberculosis	Stiff joints
In muscles	Trauma	Myositis	Stiff joints and weak muscles
	Infection		
In ligaments	Congenital	Sprains and dislocations	Stiff joints
	Trauma		
In brain and nerves (Brain)	Congenital	Cerebral palsy	Monoplegia: one extremity involved
	Trauma		Diplegia: two extremities involved
	Infection		Superior diplegia—upper extremities
			Inferior diplegia—lower extremities
			(More common term for inferior diplegia is paraplegia)
			Triplegia: three extremities involved
			Tetraplegia (quadriplegia): four extremities involved
			For spastic, athetoid and ataxic types of cerebral palsy, see Phelps, W. M.: M. Rec. 152:216
(Brain and spinal cord)	Filterable virus	Poliomyelitis	Vary from partial loss of a thumb movement to loss of all the most important movements of the body
(Spinal cord)	Congenital	Transection of spinal cord	Paraplegia
	Trauma		Quadriplegia
	Infection		
	Unknown	Tranverse myelitis	
		Spina bifida	
		Syringomyelia	
		Tumors	
(Peripheral nerve or nerves)	Trauma	Peripheral nerve injuries	Weak muscles
	Infection		
In blood and blood vessels	Unknown	Diabetes	Amputations:
		Arterio-sclerosis	One below knee
		Buerger's disease	Two below knee
			One above knee
			Two above knee
			One below and one above knee

on the ground, and there is the consequent danger of contractures from holding joints stiffly over a long period. If one or both extremities are disabled so that total weight bearing is hampered, walkers or pulleys from above may be used. However, such methods are inconvenient, and braces, artificial limbs and crutches or a combination of these are preferred as aids in locomotion. Sometimes proper bracing is sufficient to enable the subject to walk satisfactorily. If it is a matter of one artificial limb below or above the knee, the subject can learn how to walk without crutches or canes. Sometimes, however, bracing and artificial limbs are not sufficient to permit

* Tables 1 and 2 are being made into large photostated wall charts for easy reading and reference. These may be obtained from the Library of the Institute for the Crippled and Disabled.

walking, and crutches are needed, at least in the beginning. Also, there are conditions which neither lend themselves to bracing nor require artificial limbs. In these, crutches become the proper and only solution to the walking problem.

In summary, crutches are used for disabilities of the lower extremities which make it impossible or undesirable for a subject to bear the total body weight or to keep his balance and which do not lend themselves to bracing or artificial limbs or for which these aids are not sufficient in themselves.

Each disability is analyzed under the following headings: Crutch-Walking Determinants, Prescription and Comment.

3. The Basis for Prescribing Crutch Gaits

Since this is a discussion of crutch management, the intricate and important subject of braces is not covered. In using the term "weight bearing" we shall always mean weight bearing either with or without braces. That is to say, we shall consider an extremity perfectly capable of bearing weight whether it does so adequately by itself or must have a short ankle brace, a knee-locking brace extending above the knee or a long, double, knee-locking, hip-locking brace on a pelvic band. It is assumed that any extremity can be made to bear weight by suitable bracing unless it is too deformed to allow the bone alignment necessary.

This section is divided into (a) Crutch Gait Prerequisites and (b) Crutch Gait Elements, and in each case tests are given.

(a) *Crutch Gait Prerequisites and Testing for Them.* — The prerequisites for the management of crutches have already been discussed.¹ The most basic requirements for moving forward on crutches are now being restated as follows, together with the tests for these abilities:

Crutch Gait Prerequisite 1—Holding Head Up: Can the subject assume a somewhat erect position, holding head and neck upright at least sufficiently so that the way ahead may be seen?

TEST: The subject holds head and neck upright.

Crutch Gait Prerequisite 2—Grasping and Holding Crutches: Can the subject grasp the cross pieces of the crutches with the hands in such a manner that they remain under the arms?

TEST: The subject, in a sitting position, grasps a pair of crutches and places them properly under the arms and holds them there.

Crutch Gait Prerequisite 3—Moving the Crutches Forward: Can the subject move the crutches forward?

TEST: The subject, in a sitting position, moves the crutches forward as if to take steps.

If the subject proves that he has these three prerequisites, he may be considered a candidate for crutch walking. In the prescription of specific crutch gaits for orthopedic disabilities, these prerequisites are assumed to be present. Therefore, they will not appear on the prescription table.

Table 2, entitled, "Prescription of Crutch Gaits for Orthopedic Disabilities," carries four self-explanatory crutch gait elements as follows:

- I. Step ability.
- II. Weight bearing and balance ability on lower extremities.
- III. Weight bearing and balance ability on upper extremities.
- IV. Erect body maintenance ability.

These crutch gait elements are amplified and formulated into ten crutch gait determinants, which are basic to gait prescription.

Across the top of the table are the "disabilities." A "disability" group must be thought of as a group of people who, having a similar disability, can satisfy the crutch gait determinants checked. Each disability will be dis-

1. Deaver, George G., and Brown, Mary Eleanor: The Challenge of Crutches: II. Muscular Demands and Preparation, Arch. Phys. Med. 26:515 (Aug.) 1945.

cussed hereafter. Therefore, the table should not be used alone but only in conjunction with the text.

There are six classes of disabilities differentiated by the Roman numerals and eleven separate ones identified by small letters "a" and "b." The reason for this is that there are really only six distinct major disabilities resulting from all orthopedic diseases which permit walking, and these are

TABLE 2. — PRESCRIPTION OF CRUTCH GAIT FOR ORTHOPEDIC DISABILITIES.*

		CRUTCH GAIT											
Elements	Determinants	I		Disabilities				IV		V		VI	
		a	b	II	III	a	b	a	b	a	b	a	b
I. Step ability	1. Steps can be taken forward with both lower extremities	✓	✓	—	—	✓	✓	—	—	—	—	—	✓
	2. Steps can be taken forward with one lower extremity but not the other	—	—	✓	✓	—	—	—	—	✓	✓	—	—
	3. Steps cannot be taken forward with either lower extremity	—	—	✓	✓	—	—	✓	✓	—	—	—	—
II. Weight bearing and balance ability on lower extremities	4. Weight bearing and balance can be maintained on one lower extremity without crutches	✓	✓	✓	✓	—	—	—	—	—	—	—	—
	5. Weight bearing and balance can be maintained on one lower extremity, only with crutches	✓	✓	✓	✓	—	—	—	—	—	—	—	—
	6. Weight bearing and balance can be maintained on both lower extremities, only with crutches	—	—	—	—	✓	✓	✓	✓	✓	✓	✓	✓
	7. Weight bearing and balance cannot be maintained on one lower extremity, with or without crutches	—	—	✓	✓	—	—	—	—	—	—	—	—
III. Weight bearing and balance ability on upper extremities	8. Body can be lifted to clear the floor	✓	—	✓	—	✓	—	✓	—	✓	—	✓	—
	9. Body cannot be lifted to clear the floor	—	✓	—	✓	—	✓	—	✓	—	✓	—	—
IV. Erect body maintenance ability	10. Body cannot be maintained erect because spine is bent forward and fixed	—	—	—	—	—	—	—	—	—	—	—	✓
Prescriptions.....		<div>3 point: swinging-through</div> <div>3 point</div> <div>Swinging-to: swinging-through: tripod</div> <div>Tripod</div> <div>4 point alternate: 2 point alternate, swinging-through</div> <div>4 point alternate: 2 point alternate</div> <div>Swinging-to: swinging-through: tripod</div> <div>Tripod</div> <div>Swinging-to: swinging-through: tripod</div> <div>Tripod</div> <div>Rocking chair</div>											

given Roman numbers. However, there are two variants each of disabilities I to V, and these are designated as "a" and "b." The "a" and "b" disabilities are exactly the same except for the ability to raise the body off the floor, this being present in the "a" disabilities and absent in "b" disabilities.

The simplest method of using the table is to cover the disabilities with a blank sheet of paper and proceed to check the applicant with regard to the ten determinants. The tests as outlined under the "Crutch Gait Elements" which follow give instructions as to how to check the determinants.

* Tables 1 and 2 are being made into large photostated wall charts for easy reading and reference. These may be obtained from the Library of the Institute for the Crippled and Disabled.

(b) *Crutch Gait Elements and Testing for Them.* — Testing for the crutch gait elements and checking the determinants are essential for the use of the table. All tests must be made with all appliances and clothing on the subject, including braces, since it would do no good if the subject could perform the test movements in pajamas, in shorts or in the nude but could not manage the additional weight of clothing or apparatus.

Crutch Gait Element I—Step Ability: Can the subject take steps with either or both of his lower extremities; that is, can he get one foot in front of the other? (Determinants 1, 2, 3.)

Any or all of the following tests may be used, according to the condition of the subject:

TEST 1:

Position of Subject: Half sitting (on one buttock) on edge of table high enough to allow free lower extremity to hang downstretched without touching floor. Support may be provided by subject's putting his arm around neck of therapist, who stands beside him on side of hanging lower extremity and holds his pelvis so that it is as level as possible.

Instructions: Lift hanging lower extremity forward and upward, allowing knee to bend or not.

If the subject is unable to lift his lower extremities forward, another test must be tried, since steps can be taken in other ways. For instance, the quadratus lumborum muscle may be used for this purpose. The subject lifts his pelvis and lower extremity on one side and leans his trunk forward, and a step is taken by the pull of gravity.

TEST 2:

Position of Subject: Standing as well as possible, either supported or not, with one lower extremity on a raised surface such as a telephone book. The other lower extremity and pelvis on the same side should hang suspended without touching book or floor.

Instructions: Lift hanging pelvis and lower extremity straight upward by elevating pelvis on that side.

TEST 3:

Position of Subject: Standing supporting himself between parallel bars or holding onto stall bars or any other stable object.

Instructions: Move forward between the parallel bars by taking steps with the feet in any manner possible.

In case the prospective crutch walker cannot sit or stand, the next test may be used. However, it is not so good as the previous tests, since a very weak subject might not be able to raise the lower extremities upward as indicated, yet might still be able to move them forward in a standing position, in which the pull of gravity is less.

TEST 4:

Position of Subject: Supine-lying in bed or on mat or table.

Instructions: Raise lower extremity upward; knee bent or not.

Thus may Determinants 1, 2 and 3 be checked.

Crutch Gait Element II—Weight-Bearing and Balance Ability on Lower Extremities: Can the subject bear weight and keep his balance on one or both of his lower extremities? (Determinants 4, 5, 6 and 7.)

The physician should be consulted as to the degree of weight bearing which is desirable.

TEST 1:

Position of Subject: Standing unassisted.

Instructions: Raise one foot off the floor.

TEST 2:

Position of Subject: Standing with crutches, either against wall or between parallel bars for safety.

Instructions: Raise one foot off the floor.

Check Determinant 4 if Test 1 can be done.

Check Determinant 5 if Test 1 cannot be done but Test 2 can be satisfied.

Check Determinant 6 if Test 2 can be passed on both lower extremities.

Check Determinant 7 if weight cannot be borne on one lower extremity whether or not crutches are used.

Crutch Gait Element III—Weight-Bearing and Balance Ability on Upper Extremities: Can the subject push his body off the floor by pressing down on the crutches? (Determinants 8 and 9.)

TEST:

Position of Subject: Standing, or sitting in a wheelchair, between parallel bars.

Instructions: Grasp bars, push down on hands, straighten elbows and, keeping shoulders held low, raise body entirely off floor or out of wheelchair.

Push-ups in a wheelchair, in bed or on a mat may also be used as a method of judging this ability, although the parallel bar method is better, if feasible, because the body weight may be lifted entirely, whereas in a wheelchair or on a bed the body may be braced by foot rests or on the bed and thus the weight to be lifted lessened.

Crutch Gait Element IV—Erect Body Maintenance Ability: Can the subject maintain his body erect? (Determinant 10.)

To determine whether the body can be maintained erect or not, it is necessary to ask the physician whether the subject can be tested in the following main movements of the spinal column, in a sitting or standing position: forward and lateral flexion, extension and torsion.

Now that the determinants have been checked for the prospective crutch walker, the paper should be moved to the right until its pattern coincides with one of the eleven columns. The gaits prescribed appear at the bottom.

A list of the crutch gaits already described² is as follows:

- Four point alternate crutch gait
- Two point alternate crutch gait
- Three point crutch gait
- Tripod crutch gaits
 - Tripod alternate gait
 - Tripod simultaneous gait
- Swinging crutch gaits
 - Swinging-to gait
 - Swinging-through gait
- Rocking chair crutch gait

Since each prescription is a list of selected gaits, we have not included all the gaits possible for a person with a particular disability. The prescription recommends only those considered to be the most suitable, with the gait believed to be the most useful listed first. The comments under the disability discussions justify the selection and sequence of gaits prescribed. To amplify further, the tripod alternate gait is the easiest one. By rights it should be listed in many columns. However, it appears in the table only when it is the proper gait to be used, it being understood that any one able to use crutches at all can perform it. It is legitimate for a person with any disability to resort to this gait when space is limited or the ground is uncertain. The same statement applies to the tripod simultaneous gait except that it is slightly more difficult. It is also understood that any one able to perform a swinging-through gait can perform a swinging-to gait. The swinging-to gait is listed only when it is the appropriate swinging gait. The tripod gaits and swinging-to gait, of course, may be used at any time when space is limited. It is necessary to realize that there are many times when a person can move only an inch or two at a time, in which case a swinging gait would be out of the question. It is under such circumstances that the tripod gaits or any maneuver on crutches is legitimate, in fact, absolutely necessary.

It will be noted that the word "normal" does not appear in the discussion or the table. Whether a part is normal or not is of no consequence if the ten crutch determinants are used.

² Deaver, George G., and Brown, Mary Eleanor: The Challenge of Crutches: III. Standard Crutch Gaits and How to Teach Them, Arch. Phys. Med. 26:573 (Sept.) 1945.

B. Crutch Gait Prescriptions

Disability Ia

Crutch Gait Determinants 1, 4, 5, 8. —

Steps can be taken forward with both lower extremities.

Weight bearing and balance can be maintained on one lower extremity without crutches.

Weight bearing and balance can be maintained on one lower extremity only with crutches.

Body can be lifted to clear the floor.

Prescription. — Three point; swinging-through.

Comment. — In this disability one lower extremity is more disabled than the other, one being able to support weight and maintain balance without crutches, and the other requiring crutches to do this.

Since one lower extremity needs the support of crutches but the other does not, the three point gait is recommended. The subject should lean on his two crutches as he steps on his weaker lower extremity, only giving to the latter the amount of weight suggested by the physician. He can then step on his stronger lower extremity while raising his two crutches and weaker foot.

If the condition is such that the subject can be expected to get stronger, as in fracture cases, the physician will encourage the subject to place more and more weight on the weaker extremity. As the subject becomes stronger, he will soon find that a cane is going to be sufficient until he learns to walk with no aids whatever.

If the subject is likely to have to use crutches for a long period, he will undoubtedly want a faster crutch gait. Therefore, the swinging-through gait is recommended. If the subject is going to be on crutches for only a short period, however, it will not be worth while for him to learn the swinging-through gait.

For subjects wearing one artificial limb, the swinging gaits would not be appropriate, as crutches and canes are temporary for them and it would not be worth while for them to learn more than the three point gait.

Some persons with this disability may believe at the outset that one crutch is adequate. There is no rule concerning the side on which the crutch should be handled. Usually it is held on the better side. One crutch is not recommended, however, since it encourages uneven use of the whole body and may contribute to poor body mechanics and movement.

Disability Ib

Crutch Gait Determinants 1, 4, 5, 9. — These are the same as for Disability Ia, except that the body cannot be lifted to clear the floor.

Prescription. — Three point.

Comment. — Since the shoulder girdle and upper extremities are apparently not sufficiently strong to lift the body off the floor, swinging gaits cannot be attempted.

Disability IIa

Crutch Gait Determinants 2 or 3, 4 or 5, 7, 8. —

Steps can be taken forward with one lower extremity but not the other;

or

Steps cannot be taken forward with either lower extremity.

Weight bearing and balance can be maintained on one lower extremity without crutches; or

Weight bearing and balance can be maintained on one lower extremity only with crutches.

Weight bearing and balance cannot be maintained on one lower extremity, with or without crutches.

Body can be lifted to clear the floor.

Prescription. — Swinging-to; swinging-through; tripod.

Comment. — The main characteristic of this disability is that only one lower extremity functions, the other being unable to advance or bear any weight. The alternative determinants concern the relative strength of that lower extremity.

If steps can be taken forward it is the functioning lower extremity which can take them, since whether or not the useless lower extremity can take steps does not affect walking. The only significance of the ability to take steps lies in the better control at the hip joint and the consequent greater stability of the extremity. Actually the ability to take steps is of little consequence in this disability and, in fact, is not necessary.

Whether weight bearing and balance can be maintained on one lower extremity without crutches or only with crutches makes little difference, since crutches must be used in either case.

Amputees awaiting artificial limbs fit into this disability category, as do persons in the following common situation: One lower extremity is shorter, deformed and unsuited for weight bearing and therefore contributes nothing toward locomotion. If the useless limb is shorter than the functioning one, then it may be allowed to hang limply, since a brace would serve no purpose and would only be adding undesirable weight. If the useless limb is the same length or longer than the functioning one, then the better side should be raised by means of a shoe extension so that the useless lower extremity may dangle. Amputation of these useless limbs has been considered but is not done because of the emotional trauma involved.

The efficient gaits for this disability are the swinging-through gaits, only one extremity being employed. The tripod gaits are prescribed when circumstances of space and speed require them.

Disability IIb

Crutch Gait Determinants 2 or 3, 4 or 5, 7, 9. — These are the same as for Disability IIa except that the body cannot be lifted from the floor.

Prescription. — Tripod.

Comment. — All possibility for using a swinging gait vanishes for a subject with this disability when it is seen that the body cannot be raised off the floor. The tripod is the only possible gait, since the subject has only one functioning lower extremity and could not do the four point or two point alternate gaits.

Disability IIIa

Crutch Gait Determinants 1, 6, 8. —

Steps can be taken forward with both lower extremities.

Weight bearing and balance can be maintained on both lower extremities only with crutches.

The body can be lifted to clear the floor.

Prescription. — Four point alternate; two point alternate; swinging-through.

Comment. — This is a somewhat symmetrical picture. The three point gait is therefore not indicated, although it might possibly be used under certain special circumstances, with unusual combinations of weakness and strength. Nevertheless, the common crutch gait to be suggested for such

a disability is the four point alternate gait, since steps can be taken forward with both lower extremities. The two point alternate gait would be the next step in the crutch progress of the subject. It merely represents a four point alternate gait speeded up.

Double amputations,³ below and above the knee as well as one below and one above belong to this category.

Since the body can be raised off the ground, the swinging-through gait is recommended as a fast means of locomotion, except for amputees whose artificial limbs would suffer too much from their impact with the ground and also be too hard to manage with regard to knee locking.

Disability IIIb

Crutch Gait Determinants 1, 6, 9. — These are the same as for Disability IIIa except that the body cannot be lifted from floor.

Prescription. — Four point alternate; two point alternate.

Comment. — The four point and two point alternate gaits are recommended, since steps can be taken forward with both lower extremities and weight can be borne on them. In fact, these two gaits are the only possible ones, since the subject cannot lift his body off the floor.

Disability IVa

Crutch Gait Determinants 3, 6, 8. —

Steps cannot be taken forward with either lower extremity.

Weight bearing and balance can be maintained on both lower extremities only with crutches.

Body can be lifted to clear the floor.

Prescription. — Swinging-to; swinging-through; tripod.

Comment. — The logical gaits for a person with this disability are the swinging gaits because no steps can be taken forward with either lower extremity. Since weight can be taken on both lower extremities and the body can be lifted off the floor, the subject should have no difficulty in learning the swinging-through gait. The tripod gaits will undoubtedly be needed when the swinging gaits are not possible or desirable.

Disability IVb

Crutch Gait Determinants 3, 6, 9. — These are the same as for Disability IVa except that the body cannot be lifted off floor.

Prescription. — Tripod.

Comment. — Since the subject cannot lift his body off the floor, he cannot do the swinging gaits, nor is he able to perform the four point or two point alternate gaits, because he cannot get one foot in front of the other. He therefore must resort to the tripod gaits, the demands of which are simply to lift the crutches and drag the body toward the crutches.

Disability Va

Crutch Gait Determinants 2, 6, 8. —

Steps can be taken forward with one lower extremity but not the other.

Weight bearing and balance can be maintained on both lower extremities only with crutches.

Body can be lifted to clear the floor.

Prescription. — Swinging-to; swinging-through; tripod.

Comment. — The three point gait cannot be done because neither extremity can bear the weight of the body alone. The four point and two point al-

3. For further discussion of amputation gaits, see the third article of this series,² pp. 580-1.

ternate gaits cannot be performed because steps can only be taken forward with one extremity.

The swinging gaits are recommended because the body can be lifted from the floor. The tripod gaits are listed since they undoubtedly will be needed when the swinging gaits are not convenient.

Disability Vb

Crutch Gait Determinants 2, 6, 9. — These are the same as for Disability Va except that the body cannot be lifted from floor.

Prescription. — Tripod; four point alternate.

Comment. — The subject can move only one foot in front of the other, he is able to bear weight on both lower extremities and he cannot lift his body off the floor. The tripod gaits are the logical ones for him to use. However, a rather modified four point alternate gait could conceivably be managed in some cases. For instance, if the subject's left lower extremity were the one he could not move forward he would be able to get his balance on his crutches first and then raise his left crutch and advance it, following it by his right foot and then his right crutch. If he leaned on his crutches and his right foot at this point, his left foot would advance merely because of the pull of gravity. Since weight could be borne on this lower extremity such a gait would be within the realm of possibility.

Subjects with disability Va could also do this type of modified four point alternate gait. It is not listed because the swinging gaits are much more suitable.

Disability VI

Crutch Gait Determinants 1, 6, 8, 10. —

Steps can be taken forward with both lower extremities.

Weight bearing and balance can be maintained on both lower extremities only with crutches.

Body can be lifted to clear the floor.

Body cannot be maintained erect because spine is bent forward and fixed.

Prescription. — Rocking chair.

Comment. — The picture is one of ankylosis of the joints in the lower extremities as well as in the trunk. The subjects are deformed to the point of having their backs rounded forward and downward and motion limited in the vertebral and lower extremity joints. Although usually steps can be taken forward by both lower extremities, nevertheless the bent-over position of the trunk makes it mechanically difficult to take steps separately with the lower extremities. Therefore, the four point and two point alternate gaits are contraindicated. The swinging gaits are not possible simply because the body is not sufficiently erect and the lower extremities are bent at some or all joints. Since a wide base is indicated, the feet are held somewhat apart and placed on the ground one in front of the other. The only gait which the subject is able to accomplish efficiently is the rocking chair gait, in which the two crutches are placed forward and the subject rocks through on his two lower extremities in a step position.

Comment

Such are the main disabilities with the proper gaits prescribed for them. Whether or not spasticity, athetosis, tremor or flaccidity is present, the gaits recommended remain essentially the same. When there is spasticity the subject must accustom himself to working in spite of it, and with proper bracing, practice and perseverance he can learn to become somewhat the

master of his spastic condition. In cases of severe spastic paraplegia the swinging-through gait will be the one most useful for speed.

A difficulty which often arises in cases of spastic and athetoid quadriplegia is inability of the subject to place his hands on the hand pieces of crutches in a good position. A position of strong dorsiflexion of the hands is needed to hold the crutches and bear the weight of the body in swinging gaits. Dorsiflexion of the hands is a difficult motion for most subjects with cerebral palsy. However, this position should be encouraged by the instructor, and if it cannot be attained the hands should be tied onto the crutches in the desired position either with bandages or with straps. There are cases in which the hands fly off the crutches because of involuntary motion. In such cases also the hands must be tied onto the crutches. A possible solution to excessive involuntary motion when crutches are desired is use of unusually heavy crutches.

If the wrist joints are fused naturally, as in arthritis, or surgically, as may be desirable in severely deformed subjects, then, of course, the position of the hands on crutches is limited by the fixed position.

Persons with spinal cord injuries producing spastic paraplegia often cannot have their calf muscles stretched—as happens when the weight of the body is taken on the balls of the feet—without starting an ankle clonus that may throw them completely off balance and give them an unpleasant sinking feeling. It is important for such subjects to concentrate on their crutch-balancing exercises and their standing exercises to the point where they are able to work through this difficulty. It is often possible for them to stop the ankle movements by simply shifting their weight to their heels. They should be taught to place their feet down in front of the crutches in such a way as to have their heels make first contact with the floor. Ninety degree ankle stops on the braces make this possible.

It must be emphasized that the prescription material presented is not exhaustive but rather suggestive and detailed. No doubt many disabilities and gaits will be found which do not fit into the classification given. In other words, this study must be considered as a presentation of the point of view resulting from the experience of one group of crutch workers who strongly urge the recording of other points of view.

No statistical conclusions can be drawn from the preceding data. Much more experimentation will have to be done and a great deal more information gathered before there can be any real understanding of the relationships suggested herein. However, the following generalizations are given for the sake of summary:

1. The four point and two point gaits are for those who can take steps forward with both feet.
2. The three point gait is for those who must spare and aid one lower extremity.
3. The tripod gaits are for severely disabled people who cannot lift the body off the floor.
4. The swinging gaits are for those who have the power to lift the body to clear the floor.
5. The rocking chair gait is for those who have a structural deformity of the spine and are unable to keep their balance while doing other gaits.

It is hoped that rehabilitation therapists may be aided in understanding some of the problems of crutch gaits and be stimulated to explore further the fascinating field of crutch management.

NEW USES OF PROCAINE *

(Preliminary Communication)

FREDERICK M. ALLEN, M.D.

NEW YORK

Other articles¹ have reviewed the difficult development of shock and refrigeration treatments and the frustrated hopes for further research. One of the desired extensions of the investigation consisted in taking advantage of the increased vascular permeability in injured or inflamed regions in order to convey useful substances into those regions. In particular, this principle appeared to be the explanation of the marked analgesia obtained by several workers² in areas of pain or irritation by means of intravenous infusions of procaine. Preliminary tests confirmed the reality of this relief of pain with doses of procaine which are not toxic and which cause much slighter blunting of sensibility over the normal body surface, i. e., in areas where capillary permeability is not abnormally increased. The method as used by others was considerably modified in our work by increasing the dosage, lengthening the time and extending the application to a wide variety of painful conditions, of which some have been described³ and others will be described hereafter.

Two reasons may warrant calling this method briefly to the attention of physical medicine specialists. First, such physicians are frequently called on to treat painful conditions, or they cooperate with surgeons or orthopedists whose manipulations inflict pain which must be controlled. Second, this description is preparatory to attempts to alter permeability by physiotherapeutic means, so that the effects of procaine or other drugs may be obtained or augmented in selected locations.

The technic of the modified method, its degree of safety and some typical results have been described in the articles referred to. Additional illustrations are offered in the following case reports from the surgical service of Dr. Lyman Weeks Crossman.

CASE 1. — A white woman, a widow aged 69, was admitted to the hospital Sept. 28, 1945, with the history that her neck had been twisted in an accident three weeks before and had been stiff and painful ever since. Examinations and roentgenograms revealed anterior dislocation of the third cervical vertebra and fracture of the laminae of the second cervical. Attempted traction treatments proved uncomfortable and unsuccessful. Finally, on October 19, two trephine openings through the outer table of the skull were made posteriorly for insertion of traction hooks, and 8 pound traction was applied. Considerable pain ensued.

At 8:30 a. m. on October 20, 2 grains of sodium phenobarbital was injected intramuscularly, and Dr. A. Cohen started intravenous infusion of a solution containing 10 Gm. of procaine in 800 cc. of 5 per cent glucose. Presumably saline solution could have been used in such a case without harm, but it has become the common routine to use glucose in plain water as a precaution against edema in some cases. Hypersensitiveness to procaine having been excluded by the usual intradermal test, the infusion was begun fearlessly at a rate of 8 cc. a minute. Pain quickly ceased, but

From the City Hospital, Welfare Island.

This work was aided by contributions from Mr. Albert A. Volk, of New York City, and from Ciba Pharmaceutical Products, Summit, N. J.

1. Allen, F. M.: Treatment of Surgical Shock and Embolism, *J. Internat. Coll. Surgeons* 7:423 (Nov.-Dec.) 1944; also Nov.-Dec., 1945; Refrigeration in General Surgery of Limbs, *Am. J. Surg.* 68: 170 (May) 1945. Crossman, L. W., and Allen, F. M., to be published.

2. Lewy, R. B.: Treatment of Tinnitus Aurium by Intravenous Use of Local Anesthetic Agents, *Arch. Otol.* 25:178 (Dec.) 1937. Lundy, J. S.: Clinical Anesthesia, Philadelphia and London, W. B. Saunders Co., 1942. Gordon R.: Intravenous Novocaine for Analgesia in Burns (Preliminary Report), *Canad. M. A. J.* 49:478 (Dec.) 1943. McLachlin, J. A.: Intravenous Use of Novocain as Substitute for Morphine in Postoperative Case, *Canad. M. A. J.* 52:383 (April) 1945.

3. Allen, F. M.: Intravenous Obstetrical Anesthesia, *Am. J. Surg.*, Dec., 1945.

within five minutes the patient complained of dizziness. The infusion was then slowed to 1.3 cc. a minute. During the next five minutes the dizziness cleared up; pain returned but was reduced. Infusion rates of 3 cc. and later 1.6 cc. a minute then kept pain absent without causing any symptoms. The infusion was ended at 3 p. m. The analgesia usually lasts several hours, but in this instance the cause of irritation apparently subsided, for comfort continued all during the night and the next day.

The advantage over morphine and most other drugs is the absence of somnolence, loss of appetite or any other side-effects or sequels. The surgical wound having been made the preceding day, there was apparently free capillary permeability for local diffusion of procaine in this case.

CASE 2. — A white man, a laborer aged 65, sustained a compound fracture-dislocation of the right ankle in a fall on Aug. 30, 1945, and was admitted to the hospital the next day. Examinations and roentgenograms showed complete lateral dislocation of the astragalus and comminuted fractures of the supramalleolar portion of the fibula. After conservative treatments, the wound early in October was still purulent and foul smelling. Pain at rest was only moderate and intermittent, but no manipulation could be endured. Pending plans for a radical operation under refrigeration, an experimental trial of intravenous procaine infusion was permitted.

Therefore, on October 9, after a negative test for sensitiveness, a solution was prepared containing 9 Gm. of procaine in 1 liter of 5 per cent glucose in water. At 3 p. m., infusion was begun at a rate of 5 cc. a minute, but within forty seconds the patient complained of dizziness and the infusion was slowed to 1.5 cc. a minute. It was immediately found that moving the injured ankle, rubbing the ends of bone together and all other manipulations failed to elicit pain. With a view of preventing both the usual spontaneus pain and any added pain that might result from the manipulation, intravenous drip was continued at a rate so slow that the liter was used up between 3 p. m. and 4 a. m. The patient was comfortable through these thirteen hours and also on the following day.

This observation conformed with the theoretical expectation of vessel permeability in a traumatized region so free that the procaine analgesia is obtained quickly and easily. The point of special interest was that this permeability persisted more than five weeks after the injury.

CASE 3. — A different result was seen in an elderly woman who had a painful infected stump three weeks after a low thigh amputation for gangrene. Procaine infusion by the method described reduced the pain markedly without disturbing symptoms. When the infusion was incautiously increased in an attempt to abolish pain completely, a convulsion resulted. It was stopped by immediate intravenous injection of sodium phenobarbital, which was in readiness for such an emergency, though according to our other experience the convulsion would have been brief and would have subsided quickly without treatment on the mere stopping of the infusion.

According to theory, the granulation and scar tissue formation in this case may have created a barrier which prevented sufficient diffusion of procaine to control pain completely. A special sensitiveness of the central nervous system may be a further explanation of the convulsive tendency in some cases. Regardless of theory, it is certain that the convulsive threshold and the threshold of complete analgesia are sometimes almost identical. It is not yet known whether adequate doses of barbiturates or other sedatives may contribute further relief of pain while at the same time reducing the convulsive tendency. For mere analgesia in the ward, as distinct from operative anesthesia, it appears best always to keep the procaine dosage within the limit set by dizziness or other subjective complaints, and in this way there is probably never any risk of accidents. Even when pain is not thus abolished, it is usually alleviated so as to be easily endurable, and the desirability of an adjuvant use of ordinary sedatives is then a matter of judgment.

Although, according to the hypothesis, the effects described represent predominantly a local action of procaine, which diffuses through abnormally

permeable capillaries to anesthetize peripheral nerve endings, central nervous system effects are also evident in the studies now in progress. These effects increase with the dosage. If subjective symptoms of dizziness, thick speech or mental confusion are disregarded, continued intensive dosage produces a semiconscious or unconscious state in which the patient is unable to speak but may sometimes respond by nodding or other means; he may have more or less memory of events and remarks during an operation, but he is insensitive to all pain. Recovery occurs within a few minutes after the infusion is stopped, and there are no unpleasant after-effects.

This central anesthesia is now in regular use in this hospital, though the experience has not yet been sufficiently large to establish its safety in comparison with other anesthetics. The only disturbance encountered thus far, namely brief convulsions in occasional patients, seems to be avoidable by suitable preliminary administration of barbiturate and incidentally by watching the state of the muscles. Reference must be made to other articles⁴ for details as far as now known. Provisionally, this method is optimistically regarded as the ideal obstetric anesthesia, because it is quickly induced, controlled or ended; does not inhibit muscular contractions; is apparently harmless to mother and child, and prevents pain during both the delivery and any subsequent repairs. The usefulness for general surgery is not yet defined but may be important. It should be unnecessary to emphasize the fact that care and skill are necessary in the administration of each individual anesthetic agent. Intravenously injected procaine is no exception. The experience of our group, though not large, has developed a certain degree of proficiency which is being used in the utmost effort to avoid mishaps. Recalling the early institutional attacks on surgical refrigeration, it is necessary to warn that failures and deaths can probably result from mismanagement of procaine anesthesia.

It has been impossible to lay such an experimental foundation for the present method as was done in the case of refrigeration, because of the cutting off of every means for further animal experimentation. The unnecessary losses of life and limb in the recent war have been cited as an illustration of the evils of narrow centralized domination of medical science or practice. Similarly, it appears probable that wholesale suffering might have been saved and the depressing action of the usual narcotics and anesthetics avoided by adding a little procaine to the infusions which were customarily given to the wounded. The only chance of obtaining such important benefits for peace-time needs now lies in assuming the risks of clinical trials.

Conclusions

Intravenously infused procaine can relieve many forms of pain, presumably by anesthesia of peripheral nerve endings resulting from diffusion, which occurs most effectively in areas of increased capillary permeability.

Since circulating procaine is rapidly destroyed, the analgesia can be prolonged almost indefinitely by continuance of the slow intravenous drip, without apparent harm, danger or uncomfortable after-effects.

Central anesthesia with procaine lies outside this presentation but appears to be an important new application.

1031 Fifth Avenue, New York 28.

4. Allen, F. M., and others: Intravenous Procaine Analgesia and Anesthesia, to be published.

EXERCISING DEVICE FOR INCREASING JOINT ACTION

LOUIS B. NEWMAN *

Commander (MC) U.S.N.R.

The speed of recovery and the amount of residual disability depend not only on the part played by the physical therapy technician but also on what the patient does to aid in his recovery. When limitation in range of motion of a joint, whether due to disease, injury, or immobilization from casts, splints, or other devices exists, early careful and intelligent motion should be instituted.

Tissues when heated become soft and pliable, spasm is diminished, and pain is decreased. During this stage maximum beneficial results can be secured to increase the range of motion of an extremity in the shortest time. Fatigue is delayed, for during this period of maximum hyperemia its products are carried off rapidly.

The exercising device described here will aid in securing maximum joint action in less time and with minimum disability and yet permit the patient to take an active part in his own recovery.

Parts of discarded broken crutches have been used to make this joint exerciser. However, the device can be made of strips of wood and when not used in conjunction with diathermy, can be made of metal. This device can be used not only during the application of heat to the involved joint but at any time it is desired to exercise the joint and thereby increase its range and strength. The patient can sit in a chair or on the edge of the table while being treated or while exercising. In many cases the final disability has been reduced to a minimum when this proper and necessary aid has been instituted early during the convalescent period.

Two adjustable well padded straps are fastened to the side members of the exerciser (fig. 1) so that when it is applied to the affected leg, the upper strap can be secured just below the knee and the lower strap just above the ankle (fig. 2).

After securing the exerciser to the leg, the extremity can be placed in the hydrotherapy tank, under a radiant heater or in the field of diathermy applicators. The side members of the exerciser can be made to extend beyond the bottom of the foot and have small rollers attached when it is desired to support the foot and yet maintain easy motion. Another alternative is to strap the rear section of the ordinary roller skate having two rollers to the foot to aid in the back and forth motion with a minimum of effort.

With the device, it is evident that active assistive, active resistive, and passive (relaxed) motion can be applied to the extremity not only to increase the range of motion but to improve muscle strength.

An elastic strip (section of discarded automobile inner tube) or coiled spring can be attached to the exerciser (fig. 3) to increase the force aiding flexion of the limb, or the strip of elastic can be brought from the exerciser toward the patient to increase the force aiding extension.

The elastic will be found very satisfactory in converting the device into a resistive exerciser. The amount of pull of the elastic can be controlled by varying the width of the strip of elastic. The three narrow strips of wood at the upper end of the exerciser provide various positions for placing

* Reprinted, U. S. Nav. M. Bull. 43:559 (Sept.) 1944.

* Head, Department of Physical Medicine, U. S. Naval Hospital, Seattle, Washington.

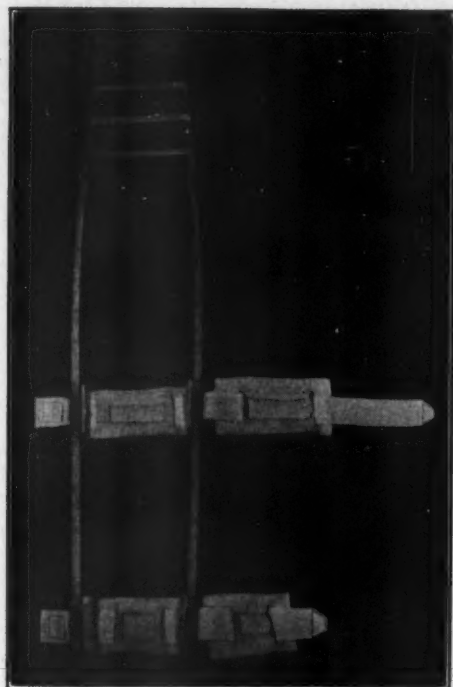


Fig. 1. — Exerciser, showing adjustable straps.



Fig. 2. — Showing application of straps below knee and above ankle.



Fig. 3. — Use in hydrotherapy tank, with aid of elastic traction.

the elastic strips to change the radius through which the force is applied.

It is readily seen that the exact amount of force applied and the range through which the joint is moved is controlled by the patient, when he grips the top of the exerciser. Movements should be slow, rhythmic and just to the point of pain. Rapid, jerky, painful movements should be avoided at all times as this merely irritates an already painful extremity.

In cases in which the range of motion of the joint is diminished because of muscle atrophy and weakness, the passive motion which can be produced with this exerciser will impress the patient with the motion that is possible and which should be sought. However, the patient should be made to realize at the very start of his treatments that nothing can substitute for his own active movements to increase the strength of the muscles which have become atrophied from inactivity or injury. This exerciser has proved its value in aiding weak muscles to overcome the resistance of a stiff joint, and in aiding in the development of the adjacent muscles. A device of similar construction can be made for use on other involved joints.

The exerciser is simple, easily constructed, and aids in increasing the range of motion and strength of an injured extremity. Active assistive and resistive as well as passive (relaxed) motion can be instituted with ease and safety and is under satisfactory control at all times, resulting in a shortened period of convalescence and a minimum of permanent disability.

STOCKINET-ADHESIVE CHEST STRAPPING

BERT C. WILEY, M.E., M.D.

Director of Physical Medicine, Miami Valley Hospital

DAYTON, OHIO

The disadvantages of the conventional methods of strapping chests with multiple overlapping strips of adhesive tape to decrease the amount of rib movement in the case of fractures, or to decrease pleural friction in the case of pleurisy, are largely avoided by use of the stockinet-adhesive strapping which is employed in the department of physical medicine of the Miami Valley Hospital.

The advantages of stockinet-adhesive strapping may be summarized as follows:

1. No adhesive material is in contact with the skin to give rise to contact dermatitis.
2. There is no danger of tearing off areas of epidermis when removing the binding.
3. Hair does not need to be shaved off the chest.
4. The strapping can be repeatedly adjusted either at the time of initial application or later.
5. It can be removed readily for the giving of diathermy or other treatment disintegration of the adhesive material by heat thus being avoided, and it can then be reapplied.
6. It can be removed by the patient or a member of his family before

the patient takes a bath, and it can then be reapplied. Therefore it lets the patient feel cleaner and retain a good skin condition.

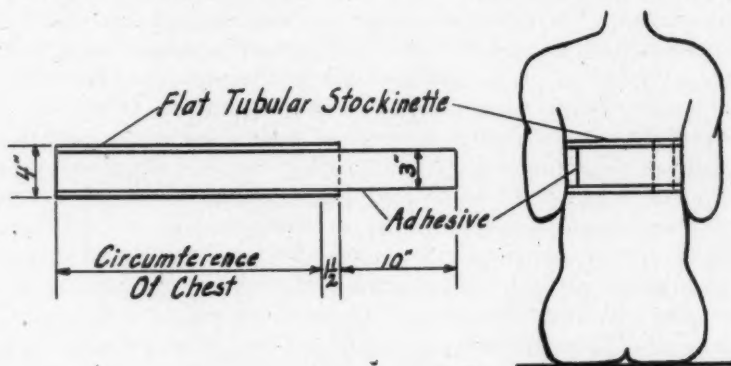
7. It will not roll into a round cord on obese patients as ordinary muslin binders do.

8. It will not slip (expand) as readily as adhesive tape applied directly to the skin.

9. It immobilizes the thoracic cage as well as any flexible binder.

Construction

A piece of 4-inch wide tubular stockinet (such as that used about an extremity prior to the application of a plaster cast) is slightly stretched around the lower part of the patient's chest and cut off at such a length as to permit its ends to overlap about $1\frac{1}{2}$ inches. This piece of stockinet is then laid out straight on a flat table and, without being stretched, has a strip of 3 inch adhesive tape stuck to its upper surface beginning flush with one end. The adhesive tape is then cut off about 10 inches beyond the opposite end of the stockinet, as shown in the accompanying illustration.



Construction and application of the stockinet-adhesive binder.

Application

The combination strip is then placed around the lower part of the patient's chest at the desired height with the stockinet surface next to the skin, and the free, adhesive tape end held out at a tangent to the torso. The patient is instructed to inhale deeply, then exhale as completely as possible and hold that chest position until the free adhesive tape can be wrapped around the portion of the binder already in place and so stuck to the back of the stockinet end of the adhesive tape. Since the stockinet extends about $\frac{1}{2}$ inch beyond each side edge of the adhesive tape, this binder can be applied well up under female breasts without causing chafing.

Summary

A combination stockinet-adhesive chest binder is described which prevents contact between the skin and the adhesive and can be repeatedly adjusted or removed and reapplied.



PHYSICAL MEDICINE IN THE ARMY AIR FORCES CONVALESCENT HOSPITAL

COL. HOWARD A. RUSK, M.C., U. S. A.

Chief, Convalescent Services Division, Office of the Air Surgeon

and

MAJOR KARL E. VOLDENG, M.C., U. S. A.

Chief, Professional Relations Branch, Convalescent Services Division,

Office of the Air Surgeon

The great advances made in physical medicine during the past few years are reflected in the convalescent services program of the Army Air Forces. The ever increasing emphasis is a result of an increased need due to the large numbers of war casualties, and the scope of the physical medicine program in Army Air Forces hospitals has grown with experience. As important as the new and approved technic is the realization that the value of physical medicine is dependent, first, on a thorough analysis and understanding of each patient and his problems, and second, as with any type of therapy, on accuracy of prescriptions both in character and in amount.

In an Army Air Forces convalescent hospital each soldier-patient is under close daily supervision of a medical officer who has been designated as his personal physician. Physicians who direct individual therapy are carefully chosen because of their training, experience and inherent ability to understand physical and emotional disabilities. They are specialists in the broadest sense; specialists in the psychology of emotional stress and the sciences of organic repair. They are specialists in prescribing, evaluating and supervising physical therapy and physical reconditioning, which require the broadest clinical experience and skill. They must have a basic knowledge of functional anatomy and physiology, psychiatry, psychology, occupational therapy and vocational guidance and a deep understanding of the human being and what motivates him.

The soldier-patient census of an Army Air Force convalescent hospital represents a tremendous variety of functional and organic medical problems. Prescriptions for therapy, therefore, run the full range of possibilities. The personal physician has as his colleagues a staff of specialists capable of utilizing each field of therapy to its maximum. After a thorough evaluation of a patient's disability, the personal physician is ready to turn to this team of workers for specific corrective measures in the fields of physical, medical, educational, occupational and recreational therapy. He serves as a coordinator in integrating the work of the specialists in their cooperative efforts toward restoration of the normal physical and functional being of the whole man.

Each convalescing Army Air Force soldier is required to utilize five hours of his day in some type of planned program of functional activity. Actually, many patients choose to work more than five hours. The physical reconditioning period may represent two hours, three hours or even more, according to the desires of the patient and the advice of his personal physician. When a physical disability exists, a large portion of this physical reconditioning must be in the form of individualized prescribed exercises and adapted sports. The efforts of the patient are constantly directed toward the correction of any existing physical weaknesses, whether this is a matter of limited range of motion in a given joint, loss of strength in a certain

muscle group, debilitated general muscle tone or a tense nervous system. Exercises "by the numbers" as given in mass calisthenics during the soldier's early military training are now replaced by personalized prescribed activity and reconditioning procedures.

In order to carry out this program effectively, it was necessary at the outset to obtain the most highly qualified men as its directors. Because of careful screening and selection, the majority of the instructors hold bachelor's degrees in physical education, many possess master's degrees and all have had extensive experience in physical reconditioning. Special courses of instruction in disability evaluation, individual and group corrective exercises, physical therapy technics, therapeutic swimming, adapted sports and allied procedures have interrelated straight physical training with the broad physical medicine program.

Outstanding among these courses were classes in physical medicine and rehabilitation conducted for physicians, educators, physical therapists and physical educators at the Institute for the Crippled and Disabled, New York City, during the winter of 1943-44. From Col. John Smith, Jr., Dr. George G. Deaver and the institute staff, these men received both theory and practice in rehabilitation procedure for the severely disabled. Procedures included testing and muscle training for the severely handicapped and instruction in the functional use of prostheses and walking aids, in technics for walking and climbing stairs and in the many factors inherent in daily living.

The patient must also be a part of the whole rehabilitation team; he must know not only what to do but why he is doing it if he is to be fully cooperative. To make the soldier-patient feel this partnership, a number of specialized publications dealing with the various types of physical disabilities and rehabilitation procedures have been prepared by the Convalescent Services Division of the Office of the Air Surgeon. The first of these, the "Handbook of Recovery,"¹ is a prescription booklet for all types of orthopedic injuries. It begins with an objective and easily understood description of the pathologic changes occurring in the various disabilities, showing the G. I. soldier how bones, muscles and nerves function, what happens when they are injured, how they heal and how healing can be speeded and aided by physical means. This section is followed by a series of two page prescription charts in which the soldier-patient is shown pictorially the normal range of motion of the affected part, the disability, the types and amounts of physical therapy needed and the exercises to be done alone and under supervision. On the back page is a personal recovery chart to be kept by the patient, which shows his progress in terms of increased range of motion and strength. This has been an effective innovation, as it gives the patient not only insight and objective understanding of his disability but great motivation.

Paralleling the "Handbook of Recovery" is the "Instructor's Manual for Physical Retraining,"² prepared to give the technician more detailed information in order that he may supervise the exercises outlined for the patient and see that maximum therapeutic effect is obtained.

Another manual is "Let's Walk,"³ the first sentence of which reads, "The object of this book is to help teach you to walk again." The booklet begins with an analysis of the important muscle groups used in walking with crutches and a series of exercises to be done while in bed, in cast, in wheel chair or on crutches, to prepare the finger flexors, triceps, abdominals

1. Army Air Forces Manual No. 23, Handbook of Recovery, New York, Army Air Forces, Training Aids Division, 1944.

2. Army Air Forces Manual No. 24, Instructors Manual for Physical Retraining, New York, Army Air Forces, Training Aids Division, 1944.

3. Army Air Forces Manual No. 49, Let's Walk, New York, Army Air Forces, Training Aids Division, 1945.

and quadriceps for crutch walking. Emphasis is placed pictorially on balance, posture, technics of walking, crutch gaits, exercises in preparation for prostheses and walking with braces and prostheses. Written in simple language and highly functional, the booklet stresses hints and tricks of the trade.

Supplementing these publications is an especially prepared film, "Out of Bed—Into Action," designed not only to orient the new patient into the convalescent program and show him what lies ahead in the way of purposeful activity but to show him, by means of action shots and animation, the effect of exercise on the basic body physiology and the "why" of physical therapy and exercise.

In many gymnasiums, or "health clubs," as they are shown in the Army Air Forces convalescent hospitals, a "buddy" system* is utilized by teaming together two soldier-patients with similar physical disabilities. In the gymnasium, in physical therapy and on the athletic field these two men work together in games, adapted sports and corrective exercise and even learn to aid each other in the prescribed massage or simple heat therapy. Increased objective interest, motivation and competition add zest to recovery.

The convalescent hospitals are staffed with military personnel who are professional physical therapists in civilian life and qualified men who have been given special training in this field; these departments are organized as a part of the physical reconditioning division so that physical therapy and corrective exercise will not be considered entities in themselves but each a part of physical medicine.

Advances are being made in the field of research and investigation in physical reconditioning. Karpovich, Weiss and their associates⁴ at the Army Air Forces School of Aviation Medicine, Randolph Field, Texas, recently completed some interesting projects in the field of physiologic effects of exercise. In an effort to establish norms for objective measurement of work output to assist the physician in prescribing not only the type but also the amount of exercise, these authors calculated the physical expenditure of energy required by individual exercises and expressed this expenditure in terms of "resting metabolic units." By using such objective measurements the physician can prescribe exercise both in type and in measured amount, as he prescribes medicine or diets, and can accurately increase or decrease the amount in accordance with progress.

The deconditioning effects of bed rest have recently been emphasized by several medical leaders.⁵ Clinically, the situation was early realized in Army Air Forces hospitals, and Gen. H. H. Arnold, commanding general of the Army Air Forces, in December, 1942 ordered that a convalescent training program be established in all such hospitals under the direction of Maj. Gen. David N. W. Grant, the Air Surgeon, in order to utilize convalescent patients' hours in channels of more purposeful activity and as an adjunct to definitive medical care.

The past dearth of scientific research in this phase of medicine is realized, and efforts to correct the inadequacy are being repeatedly stressed. Clinical workers, physiologists and Army personnel concerned with convalescent care are exhibiting real interest in this relatively new field of investigation.

Important but unattractive physical exercise can be readily put into the form of competitive sports. Probably one of the most beneficial projects in improving a soldier's physical well-being is the promoting of his interest

4. Karpovich, P. V.; Starr, M. P., and Weiss, R. A.: *Physical Fitness Tests for Convalescences*, J. A. M. A. 136:573, (Dec. 2) 1944.

5. Harrison, T. R.; Eastman, N. J.; Powers, J. H.; Dock, William; Ghormley, Ralph D., and Menninger, Karl: *Symposium on Bed Rest*, J. A. M. A. 12:1075 (Aug. 19) 1944.

in getting out in the sun and fresh air for enthusiastic game participation. In no more efficient manner can a soldier's appetite be improved, his philosophy renovated and his physiologic processes prepared for a night of complete, relaxful rest. A characteristic of the American male is the desire to participate in sports, and this inborn interest is evident even in the midst of injury, fatigue or physical disability. Individual sport accomplishments are also a part of this program of physical medicine. Golf, horseback riding, archery and just walks through the hills are forms of therapy not lost sight of. Interest in using a fly rod and the thrill of hooking a mountain trout may be the means of actively exercising a shoulder which might otherwise become permanently incapacitated. A new and interesting project, "Sit Down and Play,"⁶ instructs the patient in making a miniature piano and learning to play by ear some of the popular melodies. Such an incentive may prove to be the most efficient manner of stimulating the soldier's use of his fingers and forearms. The total program of physical reconditioning and restoration must be designed not only to be effective therapeutically but to be stimulating and interesting, and the patient must be considered as a most important member of the therapeutic team.

Opportunities for vocational training are offered the patients in each Army Air Forces convalescent hospital. The patient's interests as well as his capabilities are factors considered when he is assigned to a shop or classroom for instruction, but in this phase, too, a special endeavor is made to keep patient activity within the confines of purposeful therapy. The patient must be occupied but, more than that, he should be working on a project designed and planned with a definite therapeutic objective.

The physician's realization that many forms of therapy are at his command is not new, but from year to year during the past decade many new and valuable additions to a curative schedule have been made. New drugs have been discovered. Valuable biologicals can now be used. The growing list of such therapeutic aids is most imposing. To this list must now be added a more full and complete philosophy of physical medicine, and the successful practitioner will do well to appreciate this important field, keeping it as constantly in mind as he would his well defined thoughts of remedial surgery or specific drug therapy.

Physical therapy is being applied in Army Air Forces convalescent hospitals as fully as possible with a still expanding field of service. It is one of a large variety of activities available to medical officers for use in assisting the convalescent Air Forces patient to the fullest possible recovery. It is a powerful medicine to be carefully prescribed, intelligently supervised and altered in type and amount as the patient progresses through successful reconditioning.

6. Army Air Forces Manual No. 29, Book 1, Sit Down and Play, New York, Army Air Forces Training Aids Division, 1944.



SUPPORT OF FINGERS AND THUMB IN RADIAL NERVE PARALYSIS *

In the treatment of fractures of the humerus or forearm bones associated with radial nerve injury it is frequently necessary to continue the use of plaster. Extension support of the fingers, and where possible of the wrist, should be flexible in order to permit active motion.

The following simple method of supporting the thumb reported by Major Howard A. Swart, M.C., has been of great value in these cases and utilizes material readily available. As a substitute for spring wire or steel, metal box binding, measuring $5/8$ by $20/1,000$ of an inch, is easily obtainable. The support for the fingers consists of a 24-inch piece of this metal, doubled and riveted together. One end is incorporated in the plaster on the dorsum of the wrist and is bent so that it extends out over the fingers in the form of an arch. The second piece, somewhat shorter, is fixed in the plaster on the radial side of the forearm and bent so that it holds the thumb in the position of opposition. The metal is easily bent and clothing can be



put on without trouble by depressing the bands. Number 8 gage wire, similar to that used in the construction of drop foot braces, could be used equally well.

Two small rubber bands are attached to the dorsal band and fixed to a small piece of wood, cut to length and shape to the contours of the fingers. This support is placed beneath the proximal phalanges of the fingers. The rubber bands are attached to the center of the wood support and the fingers are thereby held in 180 degrees' extension at the metacarpophalangeal joints. More or less extension may be produced by shortening or lengthening the rubber bands. The fingers are held in slight flexion at the interphalangeal joints. To support the thumb, a loop of adhesive plaster, lined with gauze bandage, is made. This is 1 inch wide by 4 inches long. It, in turn, is fixed to the radial metal band by short rubber bands. In this way the fingers are supported in extension and the thumb in the position of opposition or grasping. Active flexion is encouraged against the pull of the rubber bands. This has served to prevent flexion contractures of the thumb and fingers and to preserve motion in the joints of these digits. "No originality is claimed for this method, which was first seen applied to patients who came from overseas hospitals. It was adopted for our use by the head of our plaster room, Sgt. William Gaskin."

* Reprinted Bull. U. S. Army Med. Dept. 88:38 (May) 1945.

ARCHIVES of PHYSICAL MEDICINE

OFFICIAL PUBLICATION AMERICAN CONGRESS OF PHYSICAL MEDICINE

.. EDITORIALS ..

THE USE OF THE PERSON TRAINED IN PHYSICAL EDUCATION IN PHYSICAL MEDICINE

The war and the use of physical training for the ill and injured men in the various branches of the armed services has done much to stimulate the recognition and use of those trained in physical education in the medical field. Up to the present time there has been a gap between those trained in medicine and those trained in health and physical education. The physiologist specializing in exercise and the functional anatomist have been much more closely affiliated with the schools of physical education than they have with the medical profession. Now in the programs of rehabilitation and particularly in the program for reconditioning of the ill patient, there is a place for the knowledge which all persons trained in physical education possess. It was recently stated that,¹ "Indeed the teacher of corrective gymnastics has contributed more to the literature on body mechanics than the physician, and has devised most of the objective tests for posture. Much of the training in correct body mechanics of the preventive type, has come from the schools. Furthermore, the modern physical educator, specializing in recreational activities, has the opportunity of developing a limited number of crafts and skills and has extensive training in the organization and administration of diversional programs differing little from those planned and executed by occupational therapists.

"The British were quick to recognize the value of physical training experts in the remedial exercise program of the fracture clinic and men with a professional background in physical education are contributing much to the reconditioning scheme of our own military hospitals. Never before in the history of medicine has there been so much interest in ways and means of expediting the restoration of functional activity and the prevention of deterioration from disuse. . . .

"The recipient of modern training in this source field comes to physical therapy with a basic training in biology, physics, general chemistry, physiological chemistry, anatomy, normal kinesiology, physiology, physiology of exercise, therapeutic exercise and physical examination. He is familiar with technics of organizing and administering group and individual activities of many types, both diversional and corrective. . . .

"Almost from the origin of physical therapy as a field of technical specialization, physical education has been accepted as the preferential pre-professional training. Since the onset of the war, even the physical educator without specialized training in physical education has been assigned an important segment of the reconditioning of the patient suffering from disability due to injury or disease."

Hellebrandt is of the opinion that training in physical education is an asset for anyone who wishes to do research in physical medicine. Persons so trained are better able to make a detailed analysis of disability in move-

1. Hellebrandt, F. A.: The Report of the Baruch Committee on Physical Medicine; Implications for Physical Education, *J. Health & Phys. Edu.* 16:367 (Sept.) 1946.

ment or locomotion necessary in the highly specialized technic of muscle training.

Hellebrandt has made a definite effort to stimulate persons trained in physical education to become more interested in physical medicine and has suggested that the person trained in physical education shall "join hands with the physical therapist and the occupational therapist."¹ She stated that "one of the healthiest things that has come thus far from the rehabilitation movement is a breaking down of the professional isolationism of these groups."

It will be conceded readily that those trained in physical education only have filled a large gap in the reconditioning programs of the armed services. This is due partially to the lack of persons trained in physical therapy necessary for such a tremendous program. Although persons trained in physical education only have not been trained specifically for the type of work they have had to do in some instances, they undoubtedly have done a good job.

However, certain factors in regard to the training of the instructor of physical education should be pointed out in order that there may not be misunderstandings and pitfalls in the future. The statement sometimes made that the average person who has been educated in schools of physical education has an extensive or even a basic knowledge of the treatment of the ill can be seriously questioned. Persons trained in physical education only have made most of the studies relative to bodily mechanics. However, most if not all of these studies have been on apparently healthy individuals. Their studies of corrective exercises have been related largely to posture. It probably would be conceded by the teachers of physical education that they have little or no knowledge of disease or the deformities produced by disease or injuries; nor do they have extensive training in correction of these deformities. Therefore, persons trained in schools of physical education are not fitted in any sense to treat the sick and handicapped except to give exercises for the uninvolved parts or conditioning exercises to nearly normal patients. Although many persons trained in physical education have been used in the program of reconditioning and rehabilitation in the United States and in British Armies, certain dangers may arise if certain factors are not clarified.

The person trained in physical education cannot be said to be a trained technical person from the standpoint of an ill or injured person until that person has reached a definite stage of recovery. The stage of recovery at which the person trained only in physical education can adequately treat the ill or handicapped should be definitely decided on and physicians should understand it. This becomes necessary because many physicians are not informed of the educational background of a fully trained physical therapy technician. There is no question as to the fact that those who have been trained only in physical education can do much in the field under the direct supervision of physicians or others especially trained. At the same time there should be a definite understanding as to what portions of this field can be left to the person trained in physical education without technical training in physical therapy. The training in teaching and administration received by those in physical education only undoubtedly would be a great asset in certain parts of the field of reconditioning.

In discussing those especially equipped for training in physical therapy technic one other group of persons besides those trained in physical medicine should not be forgotten; that is, trained nurses. The trained nurse may be lacking in training in kinesiology and functional anatomy but she has had training in caring for patients. She has had basic physiology, pathology

and anatomy. She will have seen many sick persons and will know how to care for them. She knows something of medical ethics. In most instances her training will keep her work on a practical and scientific basis.

Training in physical education has been and undoubtedly will continue to be important relative to the field of physical medicine in certain types of work or as a preprofessional training, but there should be no misunderstanding relative to the fact that a person who is trained in physical education only is a layman and should not be considered as a trained technical assistant except in rather limited circumstances in the over-all field of physical reconditioning. The fact that a large part of the literature concerning corrective and therapeutic exercise has come from persons trained in physical education should stir physicians who are more adequately trained in physiology and pathology of disease to be more aware of corrective or therapeutic exercise and learn to use it to the best advantage in medicine. The physician should learn that exercise in an over-all plan of treatment cannot be applied adequately or correctly unless he understands the physiologic effects, dose, effect in specific conditions and what is to be accomplished in general better than the person administering it.

MEDICAL NEWS

Refresher Course in Physical Medicine for Physicians

The University of Kansas School of Medicine is offering a one week refresher course in Physical Medicine beginning Jan. 21, 1946 and lasting through the 25. This course will include studies in the uses of physical therapy and occupational therapy in general practice and small hospitals. The course will emphasize the practical clinical aspects of physical medicine. Plans for organizing, equipping and intelligently using a Physical Medicine Department will be discussed. Instruction will be given in properly prescribing the various physical medicine procedures for medical, surgical and orthopedic conditions that are frequently encountered.

The course will be given at the University of Kansas School of Medicine and Hospitals, Kansas City, Kansas.

There will be no registration fee charged. Classes and clinics will meet from 9.00 a. m. to 4:30 p. m. daily. A number of clinics, demonstrations and motion pictures will be presented in addition to didactic lectures.

Among those participating in the program will be: Frank H. Krusen, M. D.; Howard Rusk, M.D.; Earl C. Elkins, M.D.; Rex Dively, M.D.; Frank Dickson, M.D.; James B. Weaver, M.D.; A. T. Steegmann, M.D., and M. J. Rumold, M.D. Miss Marie Franciscus, Chief of Occupational Therapy at the Crile General Hospital in Cleveland will take part in the program.

This course is designed primarily for physicians returning from service or any physicians interested in Physical Medicine.

For further information regarding this course write to Gordon M. Martin, M.D., Director, Physical Medicine, University of Kansas Hospitals, Kansas City 3, Kansas.

New York Society of Physical Medicine 1946

Report of the Nominating Committee:

President: Karl Harpuder, M. D.

Vice-President: Charles G. Buckmaster, M.D.

Treasurer: Richard Kovács, M.D.

Secretary: Madge C. L. McGuinness, M.D.

Executive Committee: William Bierman, M.D.; Michael J. O'Conner, M.D.; Harold Neifeld, M.D., Chairman; Edward F. Hartung, M.D.; Jerome Weiss, M.D.

At the December meeting of the New York Society of Physical Medicine the following program was presented:

1. Scientific Session: Problems of Convalescence
 1. Some Aspects of Convalescence (lantern slides).
Co. Twi, M.D., Associate Professor in Experimental Surgery, New York University (by invitation).
George Gerst, M.D., Research Fellow in Surgery, New York University (by invitation).
Discussion opened by Samuel Standard, M.D., Assistant Professor of Surgery, New York University (by invitation), and Major Sidney Licht, Chief Reconditioning Service, Lovell General Hospital, Fort Devens, Mass. (by invitation).
 2. Clinical and Psychologic Aspects of Fatigue.
Charles Brenner, M.D., Associate in Neurology, Columbia University (by invitation).
Discussion opened by John M. McKinney, Commander, M.C., U. S. N. R. (by invitation).

Experimental Test of Ultraviolet Rays in Children's Diseases

The village of Pleasantville was recently chosen for the first community wide test in the nation of the use of ultraviolet rays to disinfect air inhaled by school children. Beginning January 1 and continuing for three years, ultraviolet lamps will be used in all classrooms of the high school and two grammar schools of Pleasantville. Tentative arrangements have been made to install similar lamps in the motion picture theater, the six churches and other buildings where children congregate. The project is sponsored by the Westchester County Health Department, of which Dr. William A. Holla is director, the Milbank Memorial Fund of New York, the University of Pennsylvania School of Medicine, Philadelphia, and the General Electric Company. According to the Bulletin of the Medical Society of the County of Erie and the Buffalo Academy of Medicine, the experiments will provide radiant disinfection of air, with lamps concealed so as not to cast rays directly on the children.

The experiments are intended to destroy germs that cause measles, mumps, chickenpox, virus pneumonia and common colds, but little effect was anticipated in checking infantile paralysis.

New Medical School Planned

Plans for the establishment of a new medical school in Los Angeles were under way following action of the regents of the University of California authorizing Robert G. Sproul, president, Berkeley, to seek funds from the state legislature for the purpose. Only one third of the doctors needed annually in southern California can be trained by the existing medical school there, according to the University of California Clip Sheet.

Five Years of Rehabilitating Asthmatic Children

The National Home for Jewish Children at Denver has for the past five years been caring for underprivileged children suffering from acute bronchial asthma and other refractory upper respiratory diseases. The home is located in Denver and is available to children from all over the country whose families cannot afford extensive and costly private care.

Plan Medical Research Center

Establishment of a major medical research center in Denver as a cooperative venture of the University of Colorado School of Medicine, Denver, the University of Denver and other institutions is now being considered, according to a statement to the press by Robert L. Stearns, LL.D., president of the University of Colorado. One branch would be designed to further medical science and improve public health in the area and would be operated in connection with the Colorado medical school and the Colorado General Hospital.

Conference on Severely Handicapped

The Committee on the Severely Handicapped, sponsored by the National Society for Crippled Children and Adults, Inc., Elyria, Ohio, held a series of meetings on September 6-7, 1945 in New York City.

British Commanders

This is the title of a booklet which contains short biographical sketches of twenty-one Commanders of the Royal Navy, the British Army and the Royal Air Force, arranged in alphabetical order.

"Convalescent Swimming"

Thousands of America's war casualties undergoing therapeutic treatment at military convalescent hospitals in this country soon will benefit by a new type of swimming instruction, convalescent swimming, it has been announced by the American Red Cross. Well beyond the experimental stage, this form of swimming is being introduced in all 12 convalescent hospitals of the Army Air Forces, to be followed by similar programs in other Army hospitals.

In essence the course is "an adaptation of the physical and recreational values of swimming to the reconditioning of physical and mental disability cases." Results already achieved in cases ranging from combat fatigue to permanent disability are sufficiently encouraging, it was said, to warrant extension of the program to military convalescent hospitals throughout the country.

Amputation Cases in Army Hospitals

Surg. Gen. Norman T. Kirk announces that on May 1 there were approximately 11,000 amputation cases in army hospitals in this country, including cases already discharged. He said there are still no "basket cases," a term used to describe a person who has lost both arms and both legs. There are 6 amputees who have lost three extremities and 1 case of a nonbattle casualty who lost part of four limbs through freezing after an airplane crash. About 5 per cent of the patients have lost more than one limb, General Kirk said. Of these, 77 per cent are leg amputations, of which 49 per cent are below the knee and about 28 per cent above the knee. Half of the arm cases are below the elbow. Almost 4,000 of the amputees have been discharged to civilian life. Some soldiers are remaining in the service and have been assigned to assist in training other amputees.

Sir Thomas Lewis

The death of Sir Thomas Lewis at the age of 64 has removed from British medicine a great investigator of disease. He investigated dermatographia and produced evidence for the inde-

pendent contractility of the capillaries. He described "a triple response" of the tissues of the skin to injury, due to release from the injured cells of a histamine-like substance. Experimental and clinical studies were embodied in a remarkable book entitled "Pain," in which he showed that pain arising from the skin was of a different kind from pain arising deeply. He showed the intervention of chemical agents in the production of cutaneous pain and tenderness. He attributed the latter to axon reflexes through fibers not previously known, which he termed "nocifensor."

Rehabilitation Program in 16 MM Films

"Psychiatry in Action" is the title of a film made at a special center set up by the Emergency Medical Service of the British Ministry of Health for the treatment of war neuroses. The film consists of 7 reels, and requires 62 minutes to show. The sale price is \$67.50, or loan charge is \$2.00.

"Life Begins Again," consisting of 2 reels, and taking 21 minutes to show is the title of a film which depicts recovering casualties of different types provided with pleasant surroundings and a planned program of exercise and play designed to rehabilitate bodies and minds that workers may return to their jobs in the shortest possible time.

The films may be obtained from the British Information Services from any one of their offices which are to be found in many prominent cities.

Research Grants for \$565,547

The National Foundation for Infantile Paralysis made 25 grants and appropriations totaling \$565,547 for polio research and experiment.

This brings the total of such grants and appropriations for education since this organization was formed in 1938, to \$7,673,113.73.

Requests approved are:

University of Toronto School of Hygiene, \$4,538.

Massachusetts General Hospital, \$6,000.

State University of Iowa, \$30,000 during 5 years.

Columbia University College of Physicians and Surgeons, \$6,100.

University of Colorado School of Medicine, \$5,300.

Duke University School of Medicine, \$17,000.

U. S. Public Health Service, \$25,000.

Knickerbocker Hospital, \$100,000 during 5 years.

University of California Medical School, \$4,000.

Stanford University School of Health (Women), \$6,000.

Emory University School of Medicine, \$167,100 during 5 years.

University of Minnesota Medical School, \$12,500.

American Physiotherapy Association, \$5,000.

Children's Hospital Society of Los Angeles, \$2,250.

Boston University, School of Education, \$6,250.

Nashville School of Social Work, \$5,000.

Committee on Epidemics and Public Health, \$25,000.

University of Southern California, \$12,000.

Michael Reese Research Foundation, \$13,924.

Southwestern Medical College, \$7,225.

University of Pennsylvania, \$25,000.

University of Southern California School of Medicine, \$17,500.

University of California, George Williams Hooper Foundation, \$38,550.

Stanford University, School of Medicine, \$17,310.

University of Texas, School of Medicine, \$7,000.

Cerebral Palsy

A Handbook on Physical Therapy for Cerebral Palsy has recently been published by the Ohio Society for Crippled Children. The issuance of this booklet follows a policy of the Society to study the needs of the cerebral palsied in the state, and plan a program accordingly for them. This project has been under way for more than two years.

Robert Cunningham Joins the "Modern Hospital"

Mr. Robert M. Cunningham, Jr., associate editor of *Hygeia*, has been named managing editor of the *Modern Hospital* of Chicago.

Leon Gardner to Head Medical Library

Col. Leon L. Gardner, formerly in charge of public relations and military intelligence at the Surgeon General's Office, has been appointed director of the Army Medical Library by Surg. Gen. Norman T. Kirk. Col. Harold W. Jones, director of the library, will be retired from active duty January 1.

Correction

In the article "Observations on Muscle Spasm in Poliomyelitis. Electromyographic Studies on the Effect of Various Forms of Thermal Therapy and of Prostigmine," by Arthur L. Watkins, M.D., and Mary A. B. Brazier, Ph.D., which appeared in the June, 1945 issue of the ARCHIVES, the footnote on page 325 should have read: "Prostigmine used was a diagnostic ampul supplied by Hoffman-La Roche, Inc., containing prostigmine methylsulfate 1/40 gr. with atropine sulfate 1/100 gr."

BOOK REVIEWS

A TEXTBOOK OF SURGERY. By American Authors. Edited by *Frederick Christopher, B.S., M.D., F.A.C.S.*, Associate Professor of Surgery, Northwestern University Medical School. Chief Surgeon, Evanston (Illinois) Hospital. Fourth Edition. Cloth. Pp. 1548 with 1483 illustrations. Price, \$10.00. Philadelphia: W. B. Saunders Company, 1945.

This textbook gives the student a concise presentation of surgery which is characterized by the maximum authority of over two hundred contributors. The many advances in the different branches of surgery which have been made in recent years have rendered it impossible for any one person to be experienced in all of them. The contributors have outstanding ability in the subjects which they represent, and with few exceptions are men actively engaged in teaching surgery to medical students. The subject matter contains the tested and accepted present day principles of surgery. Debatable or incompletely tried methods are not included. Etiology, pathology and diagnosis have been properly stressed and the correct surgical treatment is carefully described. The present edition has been completely rewritten and reedited and the text has been changed to fit recent advances in surgery. The present edition may be highly recommended as a great advance over the previous edition. It presents a cross section of the best in American surgery and is truly a famous textbook of surgery.

PRESCRIBING OCCUPATIONAL THERAPY. By *William Rush Dunton, Jr., M.D.* Second Edition. Pp. 151. Price, \$2.50. Springfield, Ill.: Charles C. Thomas, 1945.

This book is informative to the physician on the special application of occupational therapy in mental disorders, general medical, surgical and orthopedic conditions, cardiac, tuberculous and for children. In this edition a chapter on rehabilitation has been added as well as up to date references. The subjects are presented briefly but clearly, so that they can be quickly understood by the busy physician. This book should be read by every physician on the staff of a hospital having an occupational therapy department. This form of treatment should be ordered by prescription. One of the most important chapters is entitled "Prescription." The author emphasizes that the prescription has an administrative as well as a therapeutic function and that the better understanding of the patient we can give to the therapist, the more intelligently she can apply the treatment.

THE BASIS OF CLINICAL NEUROLOGY. The Anatomy and Physiology of the Nervous System in Their Application to Clinical Neurology. By *Samuel Brock, M.D.*, Professor of Neurology, College of Medicine, New York University. Second edition. Cloth. Pp. 393, with 72 illustrations. Price, \$5.50. Baltimore: The Williams & Wilkins Co., 1945.

It is well recognized that a thorough knowledge of neuroanatomy and neurophysiology are essential for understanding neurology. This book conveniently summarizes these subjects, making it a usable reference source for the practicing neurologist. The peripheral nervous system is described first, then spinal cord, brain stem and finally the cerebral hemispheres. Anatomic diagrams are combined with a discussion of the normal function of the various portions of the nervous system. Explanations of some of the more familiar clinical syndromes are given in terms of disruption of physiologic functions. Differential diagnosis as to the nature of the pathologic processes is not included. This text is not complete enough to serve as a satisfactory anatomic or physiologic reference source, nor can it substitute for a neurologic textbook. It contains a little of the subject matter of all three, and should be useful to students and neurologists reviewing for examinations and to the clinicians as a handy everyday reference.

RYPINS' MEDICAL LICENSURE EXAMINATIONS: TOPICAL SUMMARIES, QUESTIONS, AND ANSWERS. Fifth Enlarged Edition Completely Revised Under the Editorial Direction of *Walter L. Bierring, M.D., F.A.C.P., M.R.C.P., Edin.* (Hon.) Member, National Board of Medical Examiners; Secretary, Federation of State Medical Boards of the United States. With the Collaboration of a Review Panel. Cloth. Price, \$6.00. Pp. 546. Philadelphia: J. B. Lippincott Company, 1945.

This book is based on the author's experience as Secretary of the New York State Board of Medical Examiners. After a critical survey a selection of typical questions has been made and these immediately follow the review presented in each of the nine major medical subjects. To assure the continued usefulness of this worthwhile publication originally written and revised three times by the late Harold Rypins, M.D., the problem of editorial supervision was placed in the hands of Dr. Walter L. Bierring assisted by a panel of outstanding teachers and clinicians who cooperated in reviewing and bringing up to date the narrative subject matter as well as the appended questions. The book is too well known to need more than our hearty recommendation of its value.

ESSENTIALS OF PHARMACOLOGY AND MATERIA MEDICA FOR NURSES. By *Albert J. Gilbert, M.D.*, Instructor of Pharmacology, Aultman School of Nursing, Canton, Ohio; Formerly Instructor of Pharmacology and Therapeutics, John Sealy College of Nursing; Formerly Instructor of Pharmacology, University of Texas Medical School and *Selma Moody, R.N.*, Instructor in Nursing Arts, The Presbyterian Hospital of the City of Chicago. Second Edition. Cloth. Pp. 290 with 20 illustrations and four colored plates. Price, \$2.50. St. Louis: The C. V. Mosby Company, 1944.

This textbook of pharmacology for nursing schools is a concise presentation of the essentials of the subject. It is arranged in accordance with "Curriculum Guide for Schools of Nursing." After the introduction on drug sources, active principles, standardization and drug laws, chapters two and three are concerned with drugs and solutions and dosage. The more strictly pharmacologic discussion is logically arranged by systems, i. e., drugs acting on the nervous system, the autonomic nervous system, the circulation, the blood, the respiration, the digestive tract, the urinary tract and the uterus. Sulfonamides, penicillin, the antisypilitics, the antimalarial drugs and the antiamebic drugs are considered in a discussion of "Specifics." There are brief presentations of hormones, vitamins and serums and vaccines. A chapter on toxicology contains general instructions for the first aid treatment of poisoning together with discussions of poisoning by carbon monoxide, hydrocyanic acid and the war gases. Following a short chapter on prescription reading, is the appendix which contains a dosage table of important drugs, a list of common Latin abbreviations, tables of weights and measures and several pages of questions for review. The volume is concluded by an adequate index. Although the discussions of individual drugs in a volume of this size are necessarily brief, this fact recommends it as a suitable text for review purposes and as a teaching text for courses in which only a relatively few hours have been allotted for the presentation.

CENTRAL STATE HOSPITAL, INDIANAPOLIS. Collected Reprints. Vol. II. Psychoses with Rheumatic Brain Disease and Other Late Cerebral Sequelae of Rheumatic Fever. (Indianapolis, Ind.: Central State Hospital.)

The eleventh volume of collected reprints from the Research Department of the Central State Hospital of Indianapolis consists of a number of clinico-anatomic studies on patients with late cerebral sequelae of rheumatic fever. Mental symptoms during acute rheumatic fever have been observed since the early days of psychiatry. In these studies, however, attention is directed by Bruetsch and Bahr to the fact that rheumatic brain involvement causing mental illness, may occur many years following the acute stage of rheumatic fever. The psychopathologic content of the psychoses of patients with rheumatic brain disease is determined by the personality and by

the age at which the brain involvement occurs, i. e., any psychiatric syndrome may be produced. The paper, entitled "Chronic Rheumatic Brain Disease as a Possible Factor in the Causation of Some Cases of Dementia Praecox" reports a group of patients with this type of rheumatic brain involvement who had been diagnosed dementia praecox. Signs of subclinical rheumatic fever as evidenced by the presence of recurrent rheumatic cardiovascular disease, were present in 9 per cent of 100 necropsies of schizophrenic patients. Another paper discusses the difficult differential diagnosis of rheumatic cerebral vascular lesions and those seen in periarthritis nodosa. It is also pointed out that rheumatic endarteritis in the past has occasionally been mistaken for syphilitic endarteritis.

Rheumatic obliterating endarteritis of the vessels of the central nervous system may prove the explanation of a number of obscure neurologic conditions in patients with rheumatic heart disease. This is discussed in a paper, entitled "Rheumatic Epilepsy. Sequel of Rheumatic Fever." Epileptic seizures appearing in the years following an attack of rheumatic fever or chorea have been traced in this study to rheumatic obliteration of cerebral vessels. All these papers are splendidly illustrated. This collection of excellent reprints is not only of interest to the psychiatrist and neurologist, but also to the pediatrician and internist.

EVERYDAY PSYCHIATRY. By *John D. Campbell, M.D.* Cloth. Price, \$6.00. Pp. 333. Philadelphia, London, Montreal: J. B. Lippincott Company, 1945.

The steadily increasing interest in modern psychiatry is shown by the large number of volumes published on this subject. Psychiatry has many implications for the general physician, internist and surgeon, and the symptoms and behavior of borderline mental conditions are significant in the everyday practice of medicine. This volume is written from the actual experience of a psychiatrist who fully understands the problems of the practitioner and discusses the personality types met in general practice rather than the psychiatric cases confined to institutions. It covers one of the most common problems of the general practitioner, how to properly evaluate the nervous, or maladjusted patient through symptom diagnosis, and how to institute effective treatment in one's own office. Dr. Campbell tells in a concise, but thorough manner the characteristics to look for in patients suffering from maladjustment. He discusses, in detail, the four personality traits—Intelligence, Conscience, Emotional Reaction, and Psychosexual Development, as well as the two secondary personality factors, Sociability and Special Modes of Adjustment. This book is written in a lively and interesting style, with enough case histories to illustrate its important points. The author has indeed fulfilled his principal aim, to fill a gap between medicine and psychiatry and has furnished a clear and practical guide to general practitioners in a fascinating field of modern medicine.

PHYSICAL MEDICINE ABSTRACTS

Exercise in Medicine. F. H. Ewerhardt.
South. M. J. 38:663 (Oct.) 1945.

A muscle in need of training because of disuse or disease must not be called on to carry a full load at the beginning. A short period of exercise repeated at frequent intervals is better than a long, fatiguing "workout." The more frequently a muscle is contracted in a stated time the more rapidly it tires; and the more complete its exhaustion, the slower its recovery. Corrective exercise should never be carried beyond the point of fatigue and should be kept well within this if the patient suffers from nervous as well as physical weakness.

A patient with nervous exhaustion may profit by participating in mild recreational exercise provided it does not require learning new movements or complicated rules, for example, a friendly game of tennis if the patient is fairly proficient in the game and the game is not highly competitive.

Activity of one group of muscles involves positive relaxation of a corresponding group. An understanding of this is helpful in solving problems involved in selection of the correct type of exercise. There are two elements in coordination of movement; the phasic or movement element and the tonic or postural element. Muscle tone is the basis of the latter, and its loss leads to gross disorders of voluntary movements. When a flexor muscle is stimulated, either voluntarily or reflexly, there is at the same time a relaxation or loss to tone in its antagonistic extensor. This inhibition of the contracted fibers of the extensor with resulting relaxation is known as Sherrington's law of reciprocal innervation and forms the fundamental principle of coordinated movements.

Treatment of Soldiers Complaining of Backache.
Some Observations Concerning Posture and Attitude. Henry M. Fox.

J. Nerv. & Ment. Dis. 102:164 (Aug.) 1945.

During the past two years the orthopedic and the psychiatric sections of a General Hospital have collaborated to an increasing extent in the attempt accurately to evaluate and appropriately to treat soldiers complaining of backache. The orthopedists were early aware of the fact that the quality of the patient's desire for recovery was often a more important factor in determining his return to effective duty than the extent of the actual organic changes in his spine as demonstrated by roentgenographic examinations. The degree of incapacity was often considered to be out of proportion to the actual orthopedic findings and the psychiatrist endeavored to consider the patient's complaints in the light of his personal attitudes, especially as they affected his service in the army. Although a few of the patients

made the most of their symptoms for personal reasons, malingering was rare and the hysterical "soldier's back" was encountered infrequently.

The orthopedist in charge of the patients with backache requested a psychiatric consultation on every man admitted to his service over a period of several months. After the orthopedic and psychiatric observations had been recorded, an approximate evaluation was made of the relative importance of these factors in each case, and at the same time the relative prominence of these factors as they appeared in any one patient was compared to what was encountered generally among the entire group of patients under consideration. The patients were divided into three groups depending on the severity of the factors present. Almost all of the patients were returned to duty as improved. All of the patients who were returned to duty had been given several weeks of postural treatment. The embryologic development of the erect posture is indicated and the intimate association in early childhood of the struggle toward independence and the attainment of the capacity to stand and walk is stressed. Further cooperation between orthopedists, psychiatrists and physical therapy technicians is urged for the successful treatment of soldiers with backache.

Ventilation in the Spread of Chickenpox and Measles Within School Rooms. Mildred Weeks Wells.

J. A. M. A. 129:200 (Sept. 15) 1945.

In testing the spread of chickenpox and measles in classrooms with and without radiant disinfection of air, i. e., where the experiment consisted in varying the concentration of micro-organisms in the air, only classes with a similar concentration of susceptibles are comparable.

Despite the small number of exposures in each group, the chance that an exposure in an unirradiated classroom will cause other cases increases with increasing susceptibility with a surprising regularity.

When corresponding susceptibility groups are compared, it is seen that a great percentage of exposures to measles resulted in secondary cases than did those of chickenpox. The cases are largely grouped in classes of lower susceptibility, and therefore, although the pattern is similar, it is less regular in the groups of higher susceptibility. In classes less than 20 per cent susceptible, only 2 of 14 exposures caused further cases, while in classes over 20 per cent susceptible, only a third failed to cause other cases.

Similar data are given for mumps. It is seen that mumps required for spread a higher percentage susceptibility as given by previous clinical attack than did chickenpox.

The ultraviolet lights increased, in all susceptibility groups and in all three diseases, the chance that an exposure would be negative, that the chain of infection would be broken.

Comparison of the percentage of negative exposures in the irradiated and unirradiated classrooms shows the difference to be greater in classes of high susceptibility, presumably because in classes of lower susceptibility sanitary ventilation is ordinarily sufficient to prevent the spread of infection with or without any added effect of disinfection of the air. Moreover, the reduction effected by the lights in productive exposures is, while definite, irregular. To those who have followed the experiments closely, this suggests that no one cause has been responsible for secondary cases under the lights, but a number of causes, some preventable, some inherent in the method. Of the latter the most serious is high relative humidity of the air, ultraviolet rays being relatively impotent against micro-organisms suspended in air more than 60 per cent saturated.

The school ventilation standard of 30 cubic feet of air per minute per child is both difficult to attain and inadequate to prevent classroom spread of chickenpox and measles except in relatively immune classes (less than 40 per cent susceptible to chickenpox, less than 20 per cent susceptible to measles).

Radiant disinfection of air can be substituted for actual air replacement. In the experiments reported, the ultraviolet lights increased, in all susceptibility groups and in the three diseases tested, chickenpox, measles and mumps, the chance that an exposure would be negative.

Sprained Ankles. Walter Scott.

U. S. Nav. M. Bull. 1145:684 (Oct.) 1945.

Concepts in the treatment of ankle sprains have become modified in the past several years in at least one respect; it is now generally held that the early institution of weight-bearing serves to cut down materially the period of disability.

With these points in mind, the author sought to devise a routine which would embrace the two essential principles, namely, early weight-bearing and good ankle support, and it is the purpose of this article to describe this routine and to set forth a few suggestions which will be helpful in differentiating a fracture from a sprain.

The support principle is a simple one, based on the fact that a military boot is a good splint in itself. By the addition of felt pads to the inside, its supporting qualities are multiplied many times. After the pads are properly applied, the boot is laced tightly to the top eyelet and the patient is instructed to walk a distance of 500 yards and to return for any adjustments that may be required.

It is surprising to see many of them return from their trial walk without the slightest limp. The bulk of these patients are sent to light duty for forty-eight hours, instructed to wear the pads for at least twenty-one days, and to return only if they have further trouble. It has been noted that about 20 per cent are likely to return, and

in that group it is usually found that the boots have not been laced tightly enough. A smaller percentage may require further care. The support should be used for at least three weeks in order to insure the best healing.

Etiology of Thromboangiitis Obliterans. Samuel Silbert.

J. A. M. A. 129:9 (Sept.) 1945.

One hundred patients with thromboangiitis obliterans have been personally followed more than ten years. All these patients stopped smoking at the beginning of treatment and have not resumed since. In all of them the disease has remained completely arrested following the initial period of treatment. Thromboangiitis obliterans is caused by smoking in individuals constitutionally sensitive to tobacco.

Physical Therapy at Home for Peripheral Arterial Disease. Christopher J. McLoughlin.

J. M. A. Georgia 34:93 (May) 1945.

As soon as a diagnosis of peripheral vascular disease has been made, a definite plan of therapy must be formulated.

In outlining a conservative regimen for the patient to follow at home it is necessary that he be instructed in routine hygienic measures aiming at benefiting his physical condition in general, and in particular attempting to improve circulation and relieve vascular spasm. The patient must be advised to wear warm clothing at all times for protection against cold and chilling of the extremities. It is advisable that he wear warm woolen socks coming almost to the knees, not only during waking hours but also when in bed. Properly fitted shoes of soft leather are essential. The feet should be given special care. It is far better to allow corns and callosities to remain untouched rather than to risk the possibility of initiating ulceration or gangrene. Hot foot baths have long been recommended as a means of producing arterial dilatation. However, alternate hot and cold foot baths are of much greater value and are just as simple to use. The duration of immersion should be individualized for each patient. In the presence of vascular disease it is advisable to change the time of immersion to shorter periods in both the warm and the cold water, and the bath may be given for twenty minutes twice or three times a day depending on the severity of the condition. Contrast baths are not recommended if open wounds, gangrene, or ulceration are present.

If the condition of the patient will warrant, warm tub baths may be prescribed.

Heat may also be applied to the extremities by the use of a simple baker or heat cradle which can be made at home or purchased for a nominal sum.

Massage is one of the oldest and most reliable means of stimulating circulation in a patient whose vascular system is normal. However, in the presence of vascular impairment massage may be dangerous, even when administered by the

hands of a skilled technician. Following any application of heat a routine of postural exercises is indicated. These should be prescribed individually for each patient and carried out twice daily for periods of fifteen to twenty minutes. In general, this routine should follow Buerger-Allen types of exercise.

A simple and effective therapeutic measure was described by Landis and Gibbon in 1933. They showed that by immersion of the hands and forearms of normal persons in water at a temperature of 110 degrees F. (43.3 C.) a vasodilatation of the lower extremities could be produced within thirty minutes.

The use of paraffin as a means of applying heat has been strongly recommended.

The Surgical Treatment of Prostatic Obstruction. **Reed M. Nesbit.**

Canad. M. A. J. 53:260 (Sept.) 1945.

The discovery of high frequency current and its application to surgery constituted a second development essential to the evolution of the resectoscope. In 1888 Hertz produced oscillating currents of very high frequency, and d'Arsonval, in 1890, discovered that such currents of greater than 10,000 oscillations per second could be passed through the body without causing any sensation other than heat, an observation which led to the therapeutic application of the high frequency current in the treatment of arthritis, and muscular and nervous diseases. Joseph Riviere, a Parisian physician, while employing the d'Arsonval high frequency diathermy current therapeutically, touched the point of one of the electrodes accidentally, and was startled to discover that a spark jumped from the electrode to the point of contact on his skin. Although the sparking effect caused a moderate amount of discomfort, it did not produce a severe burn. He decided to utilize this phenomenon therapeutically in an effort to stimulate the healing of an indolent ulcer which he had been unsuccessfully treating and the ulcer promptly healed when it was subjected to the stimulus of the d'Arsonval spark. The first application of high frequency current to urology was made by Edwin Beer, who, in 1910, described the technic of applying this current through a cystoscope for the destruction of bladder tumors. The development of this technic marked one of the greatest advances in the history of urology, for it paved the way for subsequent electroresection methods by proving that high frequency current could be employed effectively under water. But the development of high frequency currents that were capable of cutting as well as coagulating under water were not developed until 1931.

Patients who are found to have benign enlargements of the prostate gland, producing irritative symptoms but no physiologic obstruction, can be treated by conservative measures such as the application of heat and occasional massage. Heat may be applied by diathermy, rectal irrigation or sitz bath. Of the three, the latter is the least expensive, is most easily administered and is

probably as effective as either diathermy or rectal irrigation. Irritation caused by prostatic enlargement can often be greatly relieved by hyoscyamus compound, oil of sandalwood, or other so-called analgesics taken by mouth. If the irritative symptoms deriving from benign enlargement become intolerable and cannot be alleviated by measures short of surgery, prostatectomy is indicated.

Histamine Iontophoresis in General and Industrial Practice.

Brit. J. Phys. Med. 8:115 (July-Aug.) 1945.

Injections of histamine may cause a dangerous collapse similar to that of anaphylactic shock. It has been shown that by means of the galvanic current histamine may be introduced safely with a positive charge into the skin and underlying tissues. The patient feels a sensation of warmth with slight irritation in the treatment area and experiences relief of pain and tenderness. The skin is not damaged and there are no unpleasant effects except occasional slight flushing and headache.

The effort to correlate a definite skin area with each lumbar ganglion is obviously complicated by the variation in the location of the ganglia with relation to the spinal vertebrae and by differences in the criteria used by surgeons to locate and identify each of the ganglia.

At each level the operations gave characteristic patterns of high electrical skin resistance. The outlines of these patterns were continuous and divided each leg into regular segments. It was shown that the outline of the pattern for operations at any one level represented the lower boundary of the next higher dermatome. Thus, in this study the lower boundaries of T₁₂ to L₄ sympathetic dermatomes, inclusive, were determined. The outlines of these sympathetic dermatomes agreed closely with those of the sensory and vasomotor dermatomes. It is now known that the entire surface of the human body, like that of the salamander, is divided into regular segments from one end of the longitudinal axis to the other.

Tourniquet Paralysis. I. Joshua Speigel.

J. A. M. A. 129:435 (Oct. 6) 1945.

Severe damage of peripheral nerves can occur as a result of application of a rubber tourniquet for surgical ischemia.

Factors involved in the production of the paralysis are (a) pressure necrosis at the site of tourniquet application, with fibrosis and production of neuromas, (b) ischemia below the site of application of the tourniquet with death of the ischemic portion of the nerve, fibrosis and production of a neuroma in continuity, and (c) a combination of the foregoing two situations.

The radial and sciatic nerves are the most vulnerable to tourniquet paralysis.

Every case of tourniquet paralysis of a peripheral nerve immediately on its discovery should receive intensive physical therapy over a period of eight to twelve weeks. If, at the end of this

time, no appreciable return of function is evident, surgical exploration of the involved nerve should be performed and a neurolysis or even neuro-rhaphy (if feasible) should be attempted.

The Campbell-Boyd pneumatic constrictor appears to be the most efficient and least harmful of the constrictors.

Improvements in the Fluorescent Method for Detecting Tubercle Bacilli. Daniel S. Stevens.

J. Lab. & Clin. Med. 30:892 (Oct.) 1945.

The fluorescent method for detecting tubercle bacilli has several advantages. However, the published directions seem to give slides of varying quality. Bodies, other than tubercle bacilli, retain the auramine stain. These artefacts interfere with the identification of the tubercle bacilli. The present method was devised to overcome these difficulties.

The Immersion Foot Syndrome. C. C. Ungley; G. D. Channell, and R. L. Richards.

Brit. J. Surg. 33:30 (July) 1945.

Prolonged exposure of the extremities to cold insufficient to cause tissue freezing produces a well-defined syndrome. "Immersion foot" is one of the descriptive but inaccurate terms applied to this syndrome. The clinical features, aetiology, pathology, prevention and treatment of immersion foot are considered in detail. A discussion on pathogenesis is also included.

In the natural history of a typical case of immersion foot there are four stages, the period of exposure and the pre-hyperemic, hyperemic, and posthyperemic stages. Severe cases may develop blisters and gangrene. The latter is usually superficial and massive loss of tissue is rare. The hands may be affected but seldom as severely as the feet. The essential features of immersion hand are the same as those of immersion foot. Prognosis depends on severity. The extent of anesthesia at seven to ten days has been found a useful guide to the latter and has formed a basis of a method of classification. Rapid warming of chilled tissues is condemned. Cold therapy is of value for the relief of pain in the hyperemic stage, but should not be used in the prehyperemic stage. Sympathectomy and other measures designed to increase the peripheral circulation should not be employed immediately after rescue, but may have a place in the treatment of the later cold-sensitive state.

The Major Amputation Stump in Health and Disease. F. G. St. Clair Strange.

Brit. J. Surg. 33:37 (July) 1945.

Passive exercises are encouraged from the twelfth day, but exercises against resistance do not begin until three and one-half weeks following amputation. Too strenuous exertion, even in the absence of local trauma, may be found to induce an aseptic inflammation in the stump, and if this does occur, returning the patient to bed and applying ice bags will usually bring about

resolution in three to four days. The exercises are progressive in frequency, number and degree. The important movements to strengthen are extension at the knee, extension and adduction at the hip, flexion and extension at the elbow and abduction at the shoulder. With this regimen and the retention of the deep fascia in the flaps, a stump should be ready for measuring for an artificial limb in four to six weeks and should be ready for limb-wearing by the time the limb is made. Not until the patient is finally fitted with his limb should he pass from supervision.

Changes at the Macula Due to Solar Radiation. Charles McCullough.

Am. J. Ophth. 28:1115 (Oct.) 1945.

This paper presents seven cases of injury to the macula in persons who have viewed an eclipse. The injuries were found in young, healthy men of the R. C. A. F. in the course of 1,000 routine eye examinations. In all cases the exposure to solar radiation had occurred several years previously and the subjects now noted only minor abnormalities of vision.

Early Treatment of Bell's Palsy. H. P. Pickerill, and C. M. Pickerill.

Brit. M. J. 4422:458 (Oct. 6) 1945.

It is said that 75 per cent of patients with Bell's palsy recover spontaneously. The authors think this may be the cause of lifelong disfigurement for many people. In every new case of Bell's palsy the authors suggest that it should be assumed not that it will probably get well if little or nothing is done, but that it is possibly one of the 25 which will not recover by itself, and measures should be taken accordingly.

Probably the chief factor in nonrecovery of what should be the temporarily paralyzed muscles is their immediate and continued over-stretching by the nonparalyzed muscles of the opposite side of the face. A common method of attempting to overcome this is by the use of a hook in the corner of the mouth attached by a loop to the ear; but, as will be shown, this is often worse than useless. A more simple and effective method of restraining the overaction of the muscles of the sound side is by means of strapping which is described in detail.

During the third week, if recovery is not obvious, the muscles may with advantage be stimulated with weak faradic currents. Minimal doses only should be used, just sufficient to cause visible contractions in the orbicularis and zygomatic muscles. A current which causes any painful sensation is much too strong and will do harm. The current should be tried first on the operator himself and then on the sound side of the patient before being applied to the paralyzed muscles. If a current which causes contraction on the patient's sound side causes no contraction on the paralyzed side, no attempt should be made to produce contraction by using a stronger current. Short daily treatments with very weak current should be ordered. The strapping should be kept on and the treatment continued indefinitely.

It may be for only a week or two, but it may be for two or three months. The patient must be handled strictly, and be impressed with the serious risk of taking the strapping off even for one occasion, no matter how seemingly important it may be.

Influence of Galvanic Stimulation on Muscle Atrophy Resulting From Denervation. E. C. S. Jackson.

Brit. M. J. 4423:486 (Oct. 13) 1945.

It has been proved experimentally that the wasting of denervated muscle, a process prejudicial to recovery, can be prevented to a considerable extent by regular electrical stimulation of the muscle with stimuli of long duration, such as are provided by a galvanic battery.

A fluid displacement method was used to measure the volumetric changes in the hand in cases of ulnar paralysis, some treated with, others without, galvanism.

It was found that the application of 90 stimuli daily for six days a week was quite effective in preventing wasting except during the weeks immediately following denervation, though even during this period such treatment reduced the rate of wasting. The stimuli were strong enough to produce a brisk contraction, and were given at the rate of 30 a minute, with an interval of one minute between each group of stimuli to permit recovery from any possible fatigue.

There was no evidence that electrical stimulation increased muscle volume. It is important therefore to start treatment as soon as possible.

In ulnar paralysis daily galvanic stimulation is worth while, and treatment should be continued until voluntary power returns.

It is not yet known whether galvanism is equally effective in preventing wasting in large masses of muscle, since a tolerable stimulus does not affect all parts of a large muscle mass equally, the deep fibers tending to escape altogether.

Penetration of Surface Tissues With Copper by Iontophoresis. Armand J. Pereyra.

Arch. Dermat. & Syph. 52:105 (Aug.) 1945.

Ion transfer increases the electrodeposition of copper on the surface of the genital tissue of rabbits treated with aqueous copper sulfate solutions. It does not further the introduction of copper beyond the surface epithelium. By adding aerosol MA to solutions of copper sulfate, the penetration of copper by ion transfer was increased approximately twenty-five times. Maximal penetration of copper was obtained with ion transfer by incorporating the copper in an organic salt, bis (trimethylenediamino) cupric sulfate. Solutions of copper and aerosol MA or the organic copper salt applied topically without ion transfer do not produce penetration of copper. Copper is prevented from penetrating surface tissues by the tissue proteins which combine with

it. The addition of aerosol MA to solutions of copper sulfate inhibits this binding of copper by tissue proteins. The incorporation of copper in organic salts prevents this interaction of copper with tissue proteins. The amounts of copper introduced into surface tissue treated by ion transfer with aqueous solutions of copper sulfate and detergent or solutions of organic copper salt depends on the strength of current employed, the duration of treatment and the concentration of the salts used. Toxic effects of copper must be guarded against when using these preparations by ion transfer.

Raynaud's Disease Among Men. Edgar A. Hines, Jr.

J. A. M. A. 129:1 (Sept. 1) 1945.

The early establishment of a correct diagnosis of Raynaud's disease is of considerable importance to the patient. Raynaud's disease is usually a more benign disease than the more serious diseases which have Raynaud's phenomenon as a secondary manifestation, such as thromboangiitis obliterans, arteriosclerosis obliterans and scleroderma.

The treatment of Raynaud's disease depends on the degree of incapacitation. A conservative program of treatment is worth while when the disease is not too incapacitating. These measures are not curative but merely prophylactic. The patient is advised to avoid exposure to cold or changes of temperature. This may mean advising him to change his occupation or to move to a warmer climate. Protective clothing alone helps in many cases of mild Raynaud's disease. Although in the majority of instances tobacco apparently has no relationship either to the symptoms or to the course of the disease, a few patients are definitely benefited by abstinence. The new patient, if a user of tobacco, should at least give himself a fair trial of abstinence to determine if he is one who might be benefited.

The Influence of the Sister Kenny Publicity on the Treatment of Poliomyelitis. Robert V. Funsten.

Virginia M. Monthly 72:406 (Oct.) 1945.

The effect of the Sister Kenny publicity in regard to her "new and revolutionary conception and treatment of infantile paralysis" has been a great stimulation to the medical profession. It has forced a greater interest in the analysis of the methods and results of treatment. Above all, it has brought out the importance of good physical therapy, especially as related to the thorough knowledge of the action and function of individual muscles and the application of heat and carefully graduated exercises to restore the amount of function they are capable of. To carry out the technique of the Kenny method is an extremely expensive proposition. Few persons can afford it. The treatment in most instances must be subsidized by Federal, State or charitable assistance.

ARCHIVES *of* PHYSICAL MEDICINE

(Formerly Archives of Physical Therapy).

OFFICIAL JOURNAL AMERICAN CONGRESS OF PHYSICAL MEDICINE

(Formerly American Congress of Physical Therapy).

EDITORIAL BOARD

WALTER M. SOLOMON, M.D., Cleveland.

(On leave of absence, Army U. S.)

EARL C. ELKINS, M.D., Rochester, Minn. FRED B. MOOR, M.D., Los Angeles, Calif.

RICHARD KOVÁCS, M.D., New York, N. Y. ARTHUR L. WATKINS, M.D., Boston, Mass.
(Interim appointment.)

JOHN S. COULTER, M.D., Chicago 2, Ill.

VOLUME XXVI — January-December, 1945, Inclusive

OFFICERS OF THE AMERICAN CONGRESS OF PHYSICAL MEDICINE

EXECUTIVE AND EDITORIAL OFFICES

30 NORTH MICHIGAN AVENUE, CHICAGO 2

BOARD OF GOVERNORS

President — Miland E. Knapp.....	Minneapolis
President-Elect — Walter S. McClellan.....	Saratoga Springs, N. Y.
First Vice-President — *H. Worley Kendell.....	Brookhaven, Miss.
Second Vice-President — *O. Leonard Huddleston.....	Denver, Colo.
Third Vice-President — Earl C. Elkins.....	Rochester, Minn.
Fourth Vice-President — Arthur L. Watkins.....	Boston
Fifth Vice-President — Robert L. Bennett.....	Warm Springs, Ga.
Secretary — Richard Kovács.....	New York, N. Y.
Treasurer — John S. Coulter.....	Chicago
Executive Director — Walter J. Zeiter.....	Cleveland, Ohio
Executive Secretary — Marion G. Smith.....	Chicago

EXECUTIVE COUNCIL

Kristian G. Hansson, New York, N. Y., Chairman.
*Norman E. Titus, Los Angeles, Calif., Secretary.
William Bierman, New York, N. Y.
John S. Coulter, Chicago.
James C. Elsom, Madison, Wisconsin.
Frank H. Ewerhardt, St. Louis, Missouri.
Roy W. Fouts, Omaha.
John Severy Hibben, Pasadena.

A. R. Hollender, Chicago.
Disraeli Kobak, Chicago.
Frank H. Krusen, Rochester, Minn.
Fred B. Moor, Los Angeles.
Nathan H. Polmer, New Orleans.
William H. Schmidt, Philadelphia.
Frederick L. Wahrer, Marshalltown, Iowa.
Miland E. Knapp, Minneapolis, Ex-Officio.

EDITOR EMERITUS

Disraeli Kobak Chicago

REGIONAL OFFICERS

EASTERN SECTION — Chairman, G. J. P. Bar-
ger, Washington, D. C.; Secretary, A. A. Mar-
tucci, Abington Memorial Hospital, Abington,
Pennsylvania.

MID-WESTERN SECTION — Chairman, C. O.
Molander, Chicago, Illinois; Secretary, R. M.
Stecher, City Hospital, Cleveland 9, Ohio.

SOUTHEASTERN SECTION — Chairman, R. L.
Bennett, Warm Springs, Georgia; Secretary, C. J.

McLoughlin, 1010 Medical Arts Building, Atlanta,
Georgia.

SOUTHERN SECTION — Chairman, Nathan H.
Polmer, New Orleans, Louisiana; Secretary,
Euclid Smith, Station Hospital, Pampa Field,
Texas.

WESTERN SECTION — Chairman, Clarence
Dail, Loma Linda, California; Secretary, William
H. Northway, Stanford University Hospital, San
Francisco 15, California.

* In active service.

JOURNALS ABSTRACTED IN THE PHYSICAL MEDICINE ABSTRACT SECTION — JANUARY - DECEMBER, 1945

Abstracts of important articles in the following journals have been made in the
Physical Medicine Abstract Section of the ARCHIVES during the past year.



- | | |
|---|--|
| <p>Acta dermato-venereologica. Stockholm.
American Heart Journal. St. Louis.
American Journal of Diseases of Children. Chicago.
American Journal of the Medical Sciences. Philadelphia.
American Journal of Obstetrics and Gynecology. St. Louis.
American Journal of Ophthalmology. Cincinnati, Ohio.
American Journal of Pathology. Ann Arbor, Mich.
American Journal of Physiology. Baltimore.
American Journal of Surgery. New York.
American Review of Soviet Medicine. New York.
Annals of Surgery. Philadelphia.
Archives of Dermatology and Syphilology. Chicago.
Archives of Internal Medicine. Chicago.
Archives of Neurology and Psychiatry. Chicago.
Archives of Ophthalmology. Chicago.
British Journal of Dermatology and Syphilis. London.
British Journal of Physical Medicine and Industrial Hygiene. London.
British Journal of Surgery. London and Baltimore.
British Medical Journal. London.
Bulletin U. S. Army Medical Department. Carlisle Barracks, Pa.
California and Western Medicine. San Francisco.
Canadian Medical Association Journal. Montreal.
Der Chirurg. Berlin.
Clinical Journal. London.
Federation Bulletin. Chicago.
Hospitals. Chicago.
Illinois Medical Journal. Chicago.
Journal of the American Medical Association. Chicago.
Journal of Bone and Joint Surgery. Boston.
Journal of the Indiana State Medical Association. Indianapolis.
Journal of the Iowa State Medical Society. Des Moines.
Journal of Laboratory and Clinical Medicine. St. Louis.
Journal of the Maine Medical Association. Portland, Maine.</p> | <p>Journal of the Medical Association of Georgia. Atlanta.
Journal of Michigan State Medical Society. Lansing.
Journal of Neurology and Psychiatry. London.
Journal of Neurophysiology. Springfield, Ill.
Journal of Nervous and Mental Disease. New York.
The Journal of Pediatrics. St. Louis.
The Journal of Urology. Baltimore.

Kentucky Medical Journal. Bowling Green, Ky.
Khirurgiya. Moskva.

Lancet. London.

Medical Annals of the District of Columbia. Washington, D. C.
Military Surgeon. Washington, D. C.

Nebraska State Medical Journal. Lincoln.
New England Journal of Medicine. Boston.
New York State Journal of Medicine. New York.
North Carolina Medical Journal. Winston-Salem.

Ohio State Medical Journal. Columbus, Ohio.

Pennsylvania Medical Journal. Harrisburg.
The Physiotherapy Review. Chicago.
Practitioner. London.
Proceedings of the Royal Society of Medicine. London.
Proceedings of the Staff Meetings of the Mayo Clinic. Rochester, Minn.

Quarterly Bulletin, Northwestern University Medical School. Chicago.

Rocky Mountain Medical Journal. Denver.

Southern Medical Journal. Birmingham.
Surgery, Gynecology and Obstetrics with International Abstract of Surgery. London.

Texas State Journal of Medicine. Fort Worth.

United States Naval Medical Bulletin. Washington, D. C.

Virginia Medical Monthly. Richmond.

The Western Journal of Surgery, Obstetrics and Gynecology. Portland, Ore.
West Virginia Medical Journal. Charleston.</p> |
|---|--|

SUBJECT INDEX

This is an index to all the reading matter in the ARCHIVES, except the Medical News Department.

The letters used to explain in which department the matter indexed appears are as follows: "E," Editorial; "C," Correspondence; "ab," abstracts; the star (*) indicates an original article in the ARCHIVES.

This is a subject index and one should, therefore, look for the subject word, with the following exceptions: "Book Reviews" and "Deaths," are indexed under these titles at the end of the letters "B" and "D." The name of author, in brackets, follows the subject entry.

For author index see page 792.

A

- AIR: Conditioning 536—ab
Sterilization [Mildred Weeks] 778—ab
- AMPUTATION: [Herrmann and Gibbs] 538—ab; [Randall] 666—ab [Strange] 781—ab
Physical Medicine for [Dow] *139
Prosthesis [Thomas] 57—ab
Refrigeration Anesthesia for [Lobachev] 666—ab; [Yudin] 250—ab
- ANESTHESIA: Procaine for [Allen] *759
Refrigeration [Allen] *92;; [Johnston] 377—ab; [Lam] *20; [Pfeiffer and Patterson] 376—ab
- ANKLE: Sprain [Scott] 779—ab
- APPARATUS: Brace, for Foot Drop *359
Cart, Exercise, 376—ab
Device, Movement Arm *360
for Leg Bath [Dorothy Eagon and Rudolph] *703
for Poliomyelitis [Wiley] *645
for Resuscitation *649
Underwater Treatment Tank [Pruce] *23
- ARTERIOSCLEROSIS: Treatment of [Lowenstein] 445—ab
- ARTHRITIS: [Buttorff] 665—ab; [Conrad] 378—ab; [Pemberton] *374—ab
and Nervous System 445—ab
Care of [Comroe] 310—ab; *677
Cervical Headache [Williams, Jr.] 723—ab
Combined Treatment for [Baker] *389
Management of [Neligan] 602—ab
of Spine [Fletcher] 537—ab
Rheumatoid 705—E; [Bach] 601—ab; [Comroe] *677
Spa Therapy for [Scully] *233
Therapy of [Wilson] 444—ab
- ASTHMA: [Shields] 122—ab

B

- BACK: See also Spine
Pain [Farkas and Easley] 446—ab; [Moore] 311—ab; [Fox] 778—ab
- BARUCH, SIMON [Keys and Krusen] *549
- BATHS: Carbon Dioxide [McClellan and Others] 535—ab
History [Keys and Krusen] *549
Whirlpool for Leg [Dorothy Eagon and Rudolph] *703
- BONES: Atrophy, Physical Therapy in [Bisgard] 444—ab

- BRUCELLOSIS: [Harris] 311—ab
Fever, Therapeutic for 655-E—[Fowlks] *628
- BUERGER'S DISEASE: See Thromboangiitis Obliterans

BOOK REVIEWS

- Abrahamson, D. Crime and the Human Mind, 372
- Abt, I. Baby Doctor, 307
- Age, Old, Some Practical Points in Geriatrics, 437
- Ageing, 661
- Allergy, Elimination Diets for, 598
- Amputation, Modern Methods of, 371
- Anatomy and Physiology for Students of Physical Therapy, Occupational Therapy and Gymnastics, 308
- Basis for Medical and Dental Practice, 246
- Arnow, L. E. Introduction to Physiological and Pathological Chemistry, 373
- Arthritis, 48
- Baer, P. R. Medicina Dinamica, 662
- Bailey, H. Surgery of Modern Warfare, 718
- Balme, H. Unfit Made Fit, 181
- Bandaging and Splinting, 719
- Barton, Betsy. And How to Live Again, 116
- Baruch, Bernard, 48
- Bauer, J. Constitution and Disease, 372
- Bibliography, Surgery, Orthopedic, 534
- Bierring, W. L. Rypin's Medical Licensure Examinations; Topical Summaries, Questions, and Answers, 776
- Binger, C. The Doctor's Job, 532
- Biography, And How to Live Again, 116
D. T. Watson of Counsel, 720
- Blood Pressure, Hypertension and Hypertensive Disease, 306
- Body, Mechanics, Human, 436
- Bortz, E. Diabetes, 531
- Boyd, W. An Introduction to Medical Science, 598
- Brainerd, J. G. Editor, Ultra-High Frequency Technics, 437
- Brock, S. The Basis of Clinical Neurology, 776
- Brown, L. T. Essentials of Body Mechanics, 436
- Brown, Mary E. Physical Demands of Daily Life, 116
- Brown, W. Psychology and Psychotherapy, 533
- Bunnell, S. Surgery of the Hand, 306
- Bush, V. Science, the Endless Frontier, 664

- Campbell, J. D. *Everyday Psychiatry*, 777
 Cells: See *Histology*
 Central State Hospital, Vol. II, 777
 Chasis, H. *Hypertension and Hypertensive Disease*, 306
 Chemistry, *Introduction to Physiological and Pathological*, 599
 Organic Medicinal Products, 437
 Physiological and Pathological, 373
 Practical Methods in Biochemistry, 370
 Chest, *Surgical Disorders of*, 440
 Christopher, F. *A Textbook of Surgery*, 776
 Climate, *Therapy of Chronic Pulmonary Diseases*, 307
 Cobb, S. *Foundations of Neuropsychiatry*, 717
 Cole, W. H. *First Aid, Surgical and Medical*, 599
 Colsen, K. *Fractures and Fracture Treatment*, 661
 Comroe, B. I. *Arthritis and Allied Conditions*, 48
 Convalescence and Rehabilitation, 370
 Corcoran, A. C. *Arterial Hypertension, Its Diagnosis and Treatment*, 600
 Cowdry, E. V. *Textbook of Histology*, 179
 Crawford, Victoria. *Alcoholics Are Sick People*, 663
 Crime and Human Mind, 372
 Crippled Children, *Camping for*, 533
 Cyriac, J. *Deep Massage and Manipulation*, 436
 Davis, Maxine. *Woman's Medical Problems*, 721
 Deaver, G. *Physical Demands of Daily Life*, 116
 de Kruif, P. *Male Hormone*, 662
 Deutsch, Helen. *Psychology of Women*, 599
 Diabetes, 531
 Diagnoses, *Differential*, 663
 Diathermy, *Ultra-High-Frequency Technics*, 437
 Dickson, F. D. *Functional Disorders of the Foot*, 598
 Diets, 439, 598
 Disease and Civilization, 47
 and Constitution, 372
 of Digestive System, 532
 Donaldson, J. K. *Surgical Disorders of the Chest*, 440
 Dooley, M. S. *Interns Handbook*, 370
 Dunlop, D. M. Editor, *Textbook of Medical Treatment*, 531
 Dunton, Jr., W. R. *Prescribing Occupational Therapy*, 776
 Ear, *Textbook of*, 246
 Education, *Medical*, 716
 Ehlers, R. G. *Recreation While on the Mend in Hospital and at Home*, 663
 Einhorn, M. Editor, "The Hebrew Medical Journal," 600
 Electronics, 50
 Electrotherapy, 715
 Elsberg, C. A. *The Story of a Hospital*, 600
 Examinations, *Rypin's Medical Licensure*, 776
 Feldman, M. *Clinical Roentgenology of the Digestive Tract*, 717
 Field, C. *Bernard Baruch Park Bench Statesman*, 48
 First Aid, *Surgical and Medical*, 599
 Fishbein, M. *Doctors at War*, 369
 Fisher, A. G. T. *Treatment by Manipulation in General Practice*, 49
 Flagg, J. P. *Art of Resuscitation*, 307
 Foot, *Functional Disorders of the Foot*, 598
 Structure and Function, 51
 Fractures, 661, 720
 Aids to Orthopedic Surgery and, 534
 French, H. *An Index of Differential Diagnosis and Symptoms*, 663
 Gage, Edith B. *Psychiatry for Nurses*, 721
 Geriatrics: See *Also Age*, 661
 Gilbert, A. J. *Essentials of Pharmacology and Materia Medica for Nurses*, 777
 Gilbreth, Lillian M. *Normal Lives for Disabled*, 117
 Goldberger, I. H. *Health and Physical Fitness*, 49
 Goldring, W. *Hypertension and Hypertensive Disease*, 306
 Goldthwait, J. E. *Essentials of Body Mechanics*, 436
 Gonzales, T. A. *Legal Medicine and Toxicology*, 438
 Gymnastics for Students of Physical Therapy and Occupational Therapy, 308
 Haas, L. J. *Practical Occupational Therapy for the Mentally and Nervously Ill*, 117
 Hall, V. E. Editor, *Annual Review of Physiology*, 440
 Hand, *Surgery of*, 306
 Hanke, M. *Practical Methods in Biochemistry*, 370
 Harbison, F. R. D. T. *Watson of Counsel*, 720
 Health and Physical Fitness, 49
 Personal and Community, 720
 Problems, China, 722
 Herrman, G. R. *Clinical Case Taking*, 371
 Histology, *Textbook of*, 179
 Hixon, F. P. *Practical Methods of Biochemistry*, 370
 Hollender, A. R. *Textbook of the Ear, Nose and Throat*, 246
 Holmes, M. E. *Interns Handbook*, 370
 Hospital History of Psychiatric Services, 1771-1936, 438
 Story of, 600
 Howell, T. H. *Old Age*, 437
 Howett, H. H. *Camping for Crippled Children*, 533
 Hypertension, *Arterial*, 600
 Industry, *Dispensaries*, 717
 Nutrition for, 439
 Psychology of, 48
 Interns Handbook (Syracuse University), 370
 Jenkins, G. L. *Chemistry of Organic Medicinal Products*, 437
 Jones, F. W. *Structure and Function as Seen in the Foot*, 51
 Karnosh, L. J. *Handbook of Psychiatry*, 661
 Psychiatry for Nurses, 721
 Kidd, Diana. *Physical Treatment of Anterior Poliomyelitis*, 50
 Koch, F. C. *Practical Methods in Biochemistry*, 370
 Kolmer, J. D. *Clinical Diagnosis by Laboratory Examination*, 308
 Penicillin Therapy, 533
 Kovács, R. *Electrotherapy and Light Therapy with the Essentials of Hydrotherapy and Mechanotherapy*, 70
 Year Book of Physical Medicine (1944), 116
 Kraines, S. H. *Therapy of the Neuroses and Psychoses*, 309

- Kruse, H. H. Inadequate Diets and Nutritional Defects in the United States, 439
- Kuhns, J. G. Essentials of Body Mechanics, 436
- Laboratory Examinations, 309
- Law, Legal Medicine, 438
- Lederer, F. L. Textbook of the Ear, Nose and Throat, 246
- Librarian, Medical Record, 722
- Luck, J. M. Editor, Annual Review of Physiology, 440
- MacLeod, Grace. Rose's Foundation of Nutrition, 533
- Mainland, D. Anatomy as Basis for Medical and Dental Practice, 246
- Manipulation, 49
- Massage, 117, 436
- Physical Treatment by Movement, Manipulation and, 715
- Materia Medica, Essentials of, 777
- Mayer, E. Editor, Radiation and Climatic Therapy of Chronic Pulmonary Diseases, 307
- McDowall, R. J. S. Anatomy and Physiology for Students of Physical Therapy, Occupational Therapy and Gymnastics, 308
- Medicina Dinamica, 662
- Medicine and Surgery, Lippincott's Quick Reference Book, 117
- Essays in History of, 180
- Fundamentals of Internal, 245
- Handbook of Physical, 245
- Internal, Its Theory and Practice, 246
- Legal, 438
- March of, 373
- Maritime, 717
- Textbook of Medical Treatment, 531
- Treatment in General, 179
- Tropical, 719
- Mennell, J. B. Physical Treatment by Movement, Manipulation and Massage, 715
- Mental Disorders, Practical Occupational Therapy for, 117
- Mills, J. Electronics: Today and Tomorrow, 50
- Mind, Human and Crime, 372
- Moore, R. A. Ageing and Degeneration Diseases. Volume XI of a Series of Biological Symposia, 661
- Morton, D. J. Manual of Human Cross Section Anatomy, 308
- Moseley, H. F. Shoulder, Lesions of, 663
- Musser, J. H. Internal Medicine, 246
- Naylor, A. Fractures and Orthopaedic Surgery for Nurses and Masseuses, 720
- Neese, J. H. An Introduction to the Medical Sciences for Medical Record Librarians, 722
- Neurology, Basis of Clinical, 776
- Neuropathology, 716
- Neuropsychiatry, Foundations of, 717
- Synopses of, 721
- Neuroses and Psychoses, Therapy of, 309
- Norwood, W. F. Medical Education in the United States Before the Civil War, 716
- Nose, Textbook of, 246
- Nutrition, Inadequate Diets, 439
- Industrial, 439
- Rose's Foundation of, 533
- Occupational Therapy, Anatomy and Physiology for Students of, 308
- for Mentally and Nervously Ill, 117
- Prescribing, 776
- War Department Manual, 245
- Orr, H. W. A List of Books and Pamphlets on History of Surgery and Orthopedic Surgery, 534
- Page, I. H. Arterial Hypertension. Its Diagnosis and Treatment, 600
- Pediatrics, Baby Doctor, 307
- Penicillin Therapy, 533
- Pharmacology, Essentials of, 777
- Physical Medicine, Handbook of, 245
- Year Book (1944), 116
- Physical Therapy, Anatomy and Physiology for Students of, 308
- Physiology and Anatomy for Students of Physical Therapy, Occupational Therapy and Gymnastics, 308
- Annual Review of, 400
- In Health and Disease, 50
- Poliomyelitis, Treatment of, 50
- Portis, S. A. Diseases of the Digestive System, 532
- Pratt, G. K. Soldier to Civilian, 181
- Psychiatry, Essays on, 438
- Everyday, 777
- for Nurses, 721
- Fundamentals of, 718
- Handbook of, 661
- in Warfare, 662
- Modern, 664
- Novels of Oliver Wendell Holmes, 181
- Psychology and Psychotherapy, 533
- Industrial, 48
- Measurement of Adult Intelligence, 719
- of Women, 599
- Therapy of, 309
- Psychoses, 777
- Psychotherapy, 533
- Quiring, D. P. The Extremities, 308
- Records, Case Taking, Clinical, 371
- for Medical Librarians, 722
- Recreation, 663
- Reflexes, Examination of, 369
- Rehabilitation, 534
- Bulletin, Russell Sage Foundation, 662
- in Great Britain, 118
- Instructor's Manual for Physical Retraining, 439
- Rehberger, G. E. Lippincott's Quick Reference Book for Medicine and Surgery, 117
- Reimann, H. A. Treatment in General Medicine, 179
- Resuscitation, Art of, 307
- Roddis, L. H. History of Nautical Medicine, 717
- Roentgenology, Clinical, of Digestive Tract, 717
- Rose's Foundations of Nutrition, 533
- Rowe, A. H. Elimination Diets and the Patient's Allergies: A Handbook of Allergy, 598
- Russell, W. L. New York Hospital. A History of Psychiatric Service, 1771-1936, 438
- Rypin's Medical Licensure Examinations, 776
- Sadler, W. S. Modern Psychiatry, 664
- Obendorf, C. P. Psychiatric Novels of Oliver Wendell Holmes, 181

- Safety Installation and Use of Abrasive Wheels, 371
- Saphir, O. Outline of Tropical Medicine, 719
- Science, Endless Frontier, 664
- Medical Introduction, 722
- Seliger, R. V. Alcoholics Are Sick People, 663
- Selling, L. S. Synopsis of Neuropsychiatry, 721
- Shoulder, Lesions of, 663
- Sigerist, H. E. Civilization and Disease, 47; Essays in the History of Medicine, 180
- Smith, May. Handbook of Industrial Psychology, 48
- Smout, C. F. Anatomy and Physiology for Students of Physical Therapy, Occupational Therapy and Gymnastics, 308
- Spurling, R. G. Practical Diagnosis, Neurologic, 532
- Stern, R. A. Trauma in Internal Diseases with Consideration of Experimental Pathology and Medicolegal Aspects, 373
- Strecker, E. A. Fundamentals of Psychiatry, 718; Psychiatry in Modern Warfare, 662
- Surgery, Aids to Orthopedic, 534
- in Warfare, 718
- Lippincott's Quick Reference Book, 117
- Neurosurgery, Problems of, 532
- of Hand, 306
- Textbook of, 776
- Swaim, L. T. Essentials of Body Mechanics, 436
- Swett, F. H. Editor, An Introduction to the Medical Sciences for Medical Librarians, 722
- Sze, S. China's Health Problems, 722
- Taylor, C. M. Rose's Foundation of Nutrition, 533
- Teleky, L. Industrial Nutrition, 439
- Therapeutics, 531
- Throat, Textbook of, 246
- Tidy, N. M. Massage and Remedial Exercises in Medical and Surgical Conditions, 117
- Toxicology, 438
- Tuberculosis, Radiation and Climatic Therapy, 307
- Tunick, A. M. Technic of Bandaging, 719
- Turner, C. E. Personal and Community Health, 720
- Unfit Made Fit, 181
- Vasconcelos, E. Modern Methods of Amputation, 371
- War, Doctors at, 369
- Soldier to Civilian; Problems of Readjustment, 181
- Wartenberg, R. The Examination of Reflexes, 369
- Wechsler, D. Measurement of Adult Intelligence, 719
- Weil, A. Textbook of Neuropathology, 716
- Welch, W. H. Civilization and Disease, 47
- Wiggers, C. J. Physiology in Health and Disease, 50
- Women, Medical Problems of, 721
- Yater, W. M. Fundamentals of Internal Medicine, 245
- Year Book of Physical Medicine (1944), 116
- Yost, Edna. Normal Lives for the Disabled, 117
- Zieve, I. E. Aids to Orthopedic Surgery and Fractures, 534

C

- CARPUS: See also Fractures
- Dislocation [MacAusland] 54—ab
- CAUSALGIA: [Speigel and Milowsky] 376—ab
- Physical Therapy in [Bisgard] 444—ab
- CHRONAXIA: Studies in [Pollock and Others] 728—ab
- CLIMATE: Studies [Eichna and Others] 374—ab
- COLD: See also Refrigeration
- for Eyes [Rodin] 56—ab
- for Otosclerosis [Quisling] 723—ab
- Therapy in Dermatology [Bluefarb] *270
- COLLES: Fractures [White] 601—ab
- CONJUNCTIVITIS: [Rooks] 536—ab
- CONVALESCENCE: See also Reconditioning
- after Abdominal Section 184—ab
- in Hernia [Martin] 57—ab
- Posture in [Hellebrandt] 52—ab
- Program [Rusk and Voldeng] *766
- CRANIO-CEREBRAL INJURIES: Management of [Davis] 374—ab
- CRUTCHES: [Deaver and Mary Brown] *397; *515; *573; *747
- CRYOTHERAPY: See Cold, Therapy

D

- DERMATOLOGY: Cold Therapy for [Bluefarb] *270
- DIABETES: [Marble] 186—ab
- DIATHERMY: Application [Holmquest] 310—ab
- Short Wave for Breast Abscess [Nellie Lanckenaue] 184—ab
- Wavelength [Carter] *86
- DISLOCATIONS: Carpal Bones [MacAusland] 54—ab
- DYSMENORRHEA: Exercises for [Haman] 725—ab

DEATHS

- Allen, Frank, 368
- Cannon, Walter B., 714
- Dietz, H. Louis, 597
- Comroe, Bernard I., 714
- Johnson, Paul, 660
- Nylin, Josef B., 435
- Rubenstein, H. J., 597
- Snow, Albert E., 714
- Wright, Elizabeth W., 660
- Wright, Rebekah, 305

E

- EDUCATION: in Physical Medicine, [Bailey] 666—ab; [Piersoll] *133; 771—E
- Technician, Physical Therapy 529—E; [Gudakunst] *590; [Hellebrandt] *502
- ELECTRIC SHOCK THERAPY: See also Mental Diseases [Protter] 378—ab; [Ruskin] *168
- for Psychoneurosis [Kalinowsky and Others] 248—ab; 442—ab

ELECTRIC STIMULATION: for Muscles [Wehrmacher and Others] *261
for Nerves [De Jong] 184—ab
Galvanic [E. Guttmann and L. Guttmann] 56—ab; [Jackson] 782—ab

ELECTROCOAGULATION: See also Diathermy

ELECTRODIAGNOSIS: 706—E; [Pollock and Others] 666—ab

ELECTROLYSIS: and Electrocoagulation for Epilation [Niedelman] *290

ELECTROMYOGRAMS: See Muscles and Poliomyelitis

ELECTROMYOGRAPHY: [Weddell and Others] 726—ab

Studies in [Schwartz and Others] 55—ab

ELECTROSURGERY: for Granuloma Inguinale [Menville] 442—ab

for Prostatic Obstruction [Nesbit] 780—ab

for Urethral Stricture [Livermore] 183—ab

EXERCISE: [Blotner] 375—ab

and Rest 656—E

Apparatus 376—ab

Breathing, for Asthma [Shields] 122—ab

Effects [Black and Karpovich] 728—ab

for Back Pain [Moore] 311—ab

for Diabetes [Marble] 186—ab

for Eye 54—ab; [Lancaster] 56—ab

for Fractures [Cochrane] 54—ab

for Joint Action [Newman] *762

for Neuralgia [Shepler and Young] 54—ab

in Dysmenorrhea [Haman] 725—ab

in Medicine [Ewerhardt] 778—ab

Physiology of [Keys] *633

Studies [Bowers and Others] 725—ab; [Urschel] 55—ab

EXTREMITIES: Surgery of, Refrigeration for [Lobachev] 727—ab

EYES: Exercises for 54—ab; [Lancaster] 56—ab

Heat and Cold for [Rodin] 56—ab

Injury, Sun's Rays [McCullough] 781—ab

F

FATIGUE: Management of [Allan] 536—ab

FEET: See Foot

FEVER THERAPEUTIC: Cayo 122—ab

[Craig and Others] *582; [Jones and Others] 378—ab; [Kendell and Others] *76;

[Schwemlein and Others] *8; *329; *582; *623

[Thomas and Gertrude Wexler] 55—ab

Dangers of 250—ab; [Wallace and Bushby] 57—ab

for Brucellosis 655—E; [Fowlks] *628; [Harris] 311—ab

for Sclerosis, Disseminated [Freeman] 247—ab

for Syphilis [Haxthausen] 601—ab; [Schoch] 185—ab

FIBROSITIS: 725—ab

Studies [Kabat and Jones] *691

FLUORESCENCE: for Peripheral Vascular Disease [Neller and Schmidt] 314—ab

Studies, Peripheral Vascular Disease [Lange and Boyd] 58—ab

to detect Tubercle Bacilli [Stevens] 781—ab

FOOT: Brace for Drop *359

Care, Soldier's [Pemberton] *282

Disabilities [Meyer] 378—ab

Immersion [Lesser] 727—ab; [Ungley and Others] 781—ab

Trench [Boland and Others] 375—ab; [Edwards and Others] 120—ab; [White and Scoville] 602—ab

FRACTURES: [Annan] 377—ab

Colles' [White] 601—ab

Gunshot, Treatment of [Priorov] 314—ab

Occupational Therapy for [Breidenbach and Elizabeth Jamison] 537—ab

of Carpus, in Industry [Henry] 58—ab

of Humerus, Exercise for [Raney] 727—ab

of Radius [Postlethwait] 375—ab

of Sacrum [Bonnin] 444—ab

of Tibia, Treatment [Knight] 442—ab

of Treatment for [Cochrane] 54—ab; [E. Wilson] 121—ab; *349; [G. Wilson] *361

FREQUENCY: Allocations 363—E; [Carter] *86

G

GALVANOTHERAPY: See Electric Stimulation

GRANULOMA INGUINALE: Electrosurgery for [Menville] 442—ab

H

HAIR: Removal [Niedelman] *290

HALLUX VALGUS: [McElvenny] 311—ab

HAND: Immobilization of [Pratt] *649

Infected, Treatment for [Butler] 120—ab

Injuries, Treatment of [Bunnell] *693

HEAT: for Eye [Rodin] 56—ab

for Rhinologic Conditions [Wells] 443—ab

for Surgical and Orthopedic Conditions [Ober] 54—ab

Studies, Air Passage [Moritz and Others] 538—ab

HERNIA: Convalescence [Martin] 57—ab

HIGH FREQUENCY CURRENTS: See Diathermy

HISTORY. Hospital [Behan] *29

HUMERUS: Fracture, Exercises for [Raney] 727—ab

HEART DISEASE: Shoulder Pain [Duerfeldt] 723—ab

HYDROGYMNASTICS: [Pruce] *23

HYDROTHERAPY: Mineral Waters [Jarman] *153

HYPERTHERM: See Fever, Therapeutic

HYPOTHERMY. See Cold

I

INDUSTRY: [Schneider and Clark] 377—ab

Medical Center [Crosthwaite] 119—ab

Physical Medicine for 364—E; [Carlisle and McMorris] *353

Rehabilitation in [Aitken] *25; [Johnson and Hoffman] 183—ab

INFRA-RED: in Clinical Practice [Evans and Mendelssohn] 248—ab

INJURIES: Hand [Bunnell] *693

Knee [Wilkinson and Burt] 601—ab

Muscle [Smart] 311—ab

Nerve [Watkins and Mary Brazier] *69; [Mayfield] 446—ab

Spas for [Aldred-Brown and Bastow] 724—ab

ION TRANSFER: [Snow and Kraus] 182—ab; 780—ab; [Pereyra] 782—ab

J

- JOINTS: Exercise for [Newman] *762
Motion, Measurement of [Catherine West] *414
Motion, Photography of [G. Wilson and Stasch] *361

K

- KENNY METHOD: See Poliomyelitis
KNEE: Injuries [Wilkinson and Burt] 601—ab

L

- LUPUS: Vulgaris, Ultraviolet for [Burrows] 724—ab

M

- MASSAGE: Basis of [Scully] *159
for Obesity [Kalb] 313—ab
for Obstetrics 538—ab
MEDICINE: Effects of War on [Jaqua] *404
MENTAL DISEASE: Shock Therapy for [Ruskin] *168
MOVEMENT: 120—ab
MUSCLE: and Nerve Studies [De Jong] 185—ab
Injury [Smart] 311—ab
Spasm in Poliomyelitis [Watkins and Mary Brazier] *325
Strength, Measurement of [Milch] 444—ab
Studies 111—E; [Harvey and Kuffler] 185—ab; [Hines] 53—ab; [Huddleston] *197; [Nielson] 57—ab; [Thomsen and Luco] 183—ab; [Watkins and Mary Brazier] *69; [Weddell and Others] 726—ab; [Wehrmacher and Others] *261
MYOSITIS. [Hopkins] 665—ab

N

- NERVE: and Muscle, Studies [De Jong] 185—ab
Injuries [Watkins and Mary Brazier] *69
Peripheral [Harvey] 58—ab
Peripheral, Electrodiagnosis, Studies [Pollock and Others] 666—ab
Peripheral, Injuries [Mayfield] 446—ab
Peripheral, Surgery of [Davis and Others] 728—ab
Roots, Brachial Radiculitis [Turner] 313—ab
Studies [Hines] 53—ab
NEURALGIA: Intercostal [Brennemann] 446—ab
Parietal, Exercises for [McDonald] 377—ab; [Shepler and Young] 54—ab
NEUROSES: War, Physical Medicine for [Knudson] *336

O

- OBESITY: Massage for [Kalb] 313—ab
OBSTETRICS: Massage for 538—ab
OCCUPATIONAL THERAPY: and Physical Therapy, Reconditioning, Army [Rose] 442—ab
for Fractures [Breidenbach and Elizabeth Jamison] 537—ab
for Reconditioning [Thorndike] 53—ab
OTOSCLEROSIS: Cold for [Quisling] 723—ab

P

- PARALYSIS: Facial [Pickerill, H. and Pickerill, C.] 781—ab
Flaccid [Oliver and Others] 248—ab
Tourniquet [Speigel] 780—ab
PATELLA: Arthritis of [Haxton] 537—ab
PERIARTHRITIS: Shoulder [Tarsy] 312—ab
PHYSICAL FITNESS: 314 — ab; 247 — ab; [Tegner] 547—ab
PHYSICAL MEDICINE: and Drug Therapy 111—E
Center [Piersol] *133
for Amputees [Dow] *139
for Fractures [E. Wilson] 121—ab
for Neuroses [Knudson] *336
for Peripheral Vascular Disease [Jones] 121—ab
for Rehabilitation [Snow] *220
for Veterans [Mitchell] *227
in Hospital, Station [Reiger] *104
in Psychotherapy 363—E
in United States 39—E
War, Evacuation Hospital [Weeden and Stein] *272
PHYSICAL THERAPY: Prescription [Jessie Wright] 249—ab
PHYSICS: Medical 40—E; 173—E; [[Glasser] *5
POLIOMYELITIS: [Huddleston] 119 — ab; [Steggmann and Kathryn Stephenson] *485; [Varga] 119—ab; [Watkins and Mary Brazier] *69; [Wyllie] 726—ab; [Young] 445—ab
Equipment for [Wiley] *645
Kenny Publicity [Funsten] 782—ab
Kenny Treatment for [McFarland] 52—ab
Management of [Wilson] 374—ab
Muscle Spasm [Schwartz and Others] 55—ab
National Foundation 239—E
Nerve Traumatization in 249—ab
Studies [McIntosh and Others] 535—ab; [Watkins and Mary Brazier] *325
POSTURE: 527—E
in Convalescence and Rehabilitation [Hellebrandt] 52—ab
PROSTHESIS: See Amputations
PSYCHIATRY: Readjustment to Peace [Burlingame] *697
War, Activity in [Smith] 313—ab
PSYCHONEUROSES: Electric Shock Therapy for [Kalinowsky] 248—ab; 442—ab
PSYCHOSES. See Mental Diseases
PSYCHOTHERAPY: Physical Medicine for 363—E

R

- RADIUS: Fracture of [Postlethwait] 375—ab
RAYNAUD'S DISEASE: [Hines, Jr.] 782—ab
RECONDITIONING: Convalescent [Thorndike] 53—ab
in Army [Rose] 442—ab
in Civilian Hospitals [Gwynn] *275
of Civilians 299—E
Physical Therapy in [Boynton] 441—ab
Work Therapy for [Rudolph] *741
RECORDS: for Physical Therapy and Occupational Therapy [Reiger] *267
REFRIGERATION. See also Anesthesia
[Cayford and Pretty] 443—ab; [Kross] 538—

ab; [Lam] *20; [Pfeiffer and Patterson]
Cold, Treatment [Allen and Others] *499
for Surgery 444—ab; [Allen] *92; [Johnston]
377—ab; [Lobachev] 666—ab; 727—ab
REHABILITATION: 312—ab; [Burrows] 724
—ab; [Clark] *206; [Johnson and Hoffman]
183—ab; [Kersley] 312—ab; [Montgomery]
*214; [Snow] *220 [Zeiter] 535—ab
and Convalescence, Posture in [Hellebrandt]
52—ab
in Armed Forces [Blain] 445—ab
in Industry [Aitken] *25; [Crosthwaite] 119—
ab
in Medicine [Horder] 312—ab
in Rheumatism [Hiss] 442—ab
Orthopedic [Ward] 729—ab
RESPIRATION: Artificial [Hope-Gill] 378—
—ab; [Viswanathan] 376—ab
REST: [Pemberton] *618
Abuse of [Krusen] 441—ab
and Exercise 656—E
for Tuberculosis [Peck and Willis] 728—ab
RESUSCITATION: See also Respiration
Manual and Mechanical 56—ab; 109—ab
RHEUMATISM: See also Arthritis
[Abrahams] 725—ab
Palindromic [Paul and Carr] *687
Rehabilitation for [Hiss] 442—ab
ROENTGEN, WILHELM: Anniversary [Car-
ter and Coulter] *701

S

SACRUM: Fracture [Bonnin] 444—ab
SCALENUS ANTICUS SYNDROME: [Love]
727—ab
SCLEROSIS, Disseminated, Fever, Therapeutic
for [Freeman] 247—ab
SCOLIOSIS: Studies [Schwartzmann and
Miles] 443—ab
SHOCK See also Electric Shock
[Katzenbogen and Others] 58—ab
Therapy, Indications for [Proctor] 378—ab
Therapy with Curare [Kuitert] *99
SHOULDER: Musculotendinous Cuff [Howorth]
537—ab; [McLaughlin] 665—ab
Pain in Heart Disease [Duerfeldt] 723—ab
Periarthritis of [Tarsy] 312—ab
SKIN: Resistance, Electrical, Studies [Richter
and Woodrue] 728—ab
SPAS: 593—E; [Kovács] *567; *613; *683
for Industrially Injured [Aldred-Brown and
Bastow] 724—ab
Therapy [Goldberger] *558; [Scully] *233
SPINE: Arthritis of [Fletcher] 537—ab
Arthritis, Treatment [Baker] *389
SPONDYLITIS: See Spine
STRAPPING: Stockinet-Adhesive [Wiley] *764
SUDECK'S DISEASE: See Bones

SURGERY: Plastic, Physical Therapy in [Reidy]
312—ab
SYMPATHECTOMY: [Harpuder] *149
SYPHILIS. [Haxthausen] 601—ab
Chemotherapy in [Speiser and Others] 443—ab
Fever, Therapeutic for [Schoch] 185—ab

T

TECHNICIAN: See Education
TEMPERATURE: Studies [Conley and Nick-
erson] 724—ab; [Moreira and Others] 443
—ab
TENOSYNOVITIS: Bicipitas [Lippmann] 183
—ab
THROMBOANGIITIS OBLITERANS: Treat-
ment [Hildenbrand] 441—ab; [Lowenstein]
445—ab; [Silbert] 779—ab
TIBIA: Fracture [Knight] 442—ab
TUBERCULOSIS: [Levine] 185—ab
Rehabilitation [Grow and Others] 182—ab
Rest, Dangers of [Peck and Willis] 728—ab

U

ULCERS: Therapy for [Thorsén] *638
ULTRAVIOLET: See also Aid Disinfection
Air Disinfection [Snock] 446—ab
and Physical Fitness [Allen and Cureton] *641
for Industrial Conditions [Crosthwaite] 119—ab
for Lupus Erythematosus [Pillow and Palmer]
724—ab
for Lupus Vulgaris [Burrows] 724—ab
for Surgery [Fraser] 250—ab
Sensitization to [Erskine] 186—ab
Tests, Causing Conjunctivitis [Rooks] 536—ab
URETHRA: Stricture, Electrocoagulation for
[Livermore] 183—ab

V

VASOMOTOR SYSTEM: Circulatory Adjust-
ments [Landis] 52—ab
Fluorescence in [Neller and Schmidt] 314—ab
Sympathectomy [Harpuder] *149
Treatment [Thorsén] *638
Treatment, Advances, Recent [Jones] 121—ab
Treatment, Home [McLoughlin] 779—ab
Treatment, Peripheral Vascular Disease [de Ta-
kats] 601—ab
VETERANS AFFAIRS: [Mitchell] *227
Rehabilitation of [Johnson and Hoffman] 183—
ab
VOLKMANN'S CONTRACTURE: [Holmes
and Others] 538—ab

W

WALKING: Postoperative [Nixon] 314—ab
WATER: Mineral, Studies of [Jarman] *153
WOUNDS: Physical Therapy for [Piontovsky]
375—ab

AUTHOR INDEX

In this Index are the names of the authors which have appeared in the *Archives*. The (*) preceding the page reference indicates that the article appeared in full in the *Archives*, "d," discussion. The "ab" following page references indicates abstract. For subject index see page 785.

A

Abrahams, A., 725—ab
Aitken, A. P., *25
Aldred-Brown, G. R. P., 725—ab
Allan, F. N., 536—ab
Allen, F. M., *92, 536—ab, *499, *759
Allen, R. M., *641
Annan, J. H., 377—ab
Arieff, A. J., 666—ab, 728—ab
Ashe, W. F., 374—ab
Asher, H. A., 443—ab

B

Bach, F., 601—ab
Badgley, C. E., 535—ab
Bailey, L. D., 666—ab
Baker, L. D., *389
Barrera, S. E., 248—ab
Bastow, J., 724—ab
Bauer, K. H., 665—ab
Baur, A. K., 58—ab
Bean, W. B., 374—ab
Behan, R. J., *29
Bisgard, J. D., 444—ab
Black, W. A., 728—ab
Blain, D., 445—ab
Blotner, H., 375—ab
Bluefarb, S. M., *270
Boland, F. K., 375—ab
Bonnin, G. J., 444—ab
Bouman, H. D., 55—ab
Bowers, E., 725—ab
Boyd, L. J., 58—ab
Boynton, B. L., 441—ab
Brazier, Mary A. B., *69, *325
Breidenbach, L., 537—ab
Brennemann, J., 446—ab
Brooks, C. R., 347—d, 231—d
Brown, Mary E., *397, *515, *573, *747
Bunnell, S., *693
Burlingame, C. C., *697
Buroker, F. M., *623, *582
Burrows, A., 724—ab
Burt, H. A., 601—ab
Bushby, S. R. M., 57—ab
Butler, E. C. B., 120—ab
Buttorff, G. S., 665—ab

C

Campbell, E. J. M., 725—ab
Carlisle, J. M., *353

Carpenter, C. M., 378—ab
Carr, T. L., *687
Carter, H. A., *86, *701
Cayford, A. H., 443—ab
Cayo, E. P., 122—ab
Channell, G. D., 781—ab
Clairborne, T. S., 375—ab
Clark, C. L., 337—ab
Clark, D. A., *206
Cochrane, W. A., 54—ab
Comroe, Bernard I., 310—ab, *677
Conley, C. L., 724—ab
Conrad, A. A., 378—ab
Consolazio, F., 443—ab
Coulter, J. S., *701
Coyne, A. R. M., 58—ab
Craig, R. M., *8, *329, *582, *623
Crossman, L. W., 186—ab, *499
Crosthwaite, B., 119—ab
Cureton, T. K., *641

D

Dail, C. W., 498—d
Davis, L., 374—ab, 728—ab
Deaver, G. G., *397, *515, *573, *747
De Jong, H., 185—ab
de Takats, G., 601—ab
Doulin, Alice T., 535—ab
Dow, R. F., *139
Duerfeldt, T. H., 723—ab

E

Eagon, Dorothy M., *703
Easley, G. W., 446—ab
Edwards, J. C., 120—ab
Eichna, L. W., 374—ab
Erskine, D., 186—ab
Evans, D. S., 248—ab
Ewerhardt, F. H., 778—ab

F

Farkas, A., 446—ab
Feinstein, B., 726—ab
Fischer, E., 498—d
Fletcher, E., 537—ab
Forbes, A. P., 443—ab
Fowlks, E. W., *628
Fox, H. M., 778—ab

Fraser, B., 250—ab
Freeman, W., 247—ab
Funsten, R. V., 782—ab

G

Ghormley, R. K., 535—ab
Gibbs, E. W., 538—ab
Glasser, O., *5
Goldberger, J., *558
Golseth, J. G., 728—ab, 666—ab
Grow, J. B., 182—ab
Gudakunst, D. W., 535—ab, *590
Guttmann, E., 56—ab
Guttmann, L., 56—ab
Gwynn, H. B., *275

H

Haman, J. O., 725—ab
Hanson, H., 378—ab
Hansson, K. G., 496—d
Harpuder, K., *149
Harris, H. J., 311—ab
Harvey, A. M., 58—ab, 185—ab
Haxthausen, H., 601—ab
Haxton, H., 537—ab
Hellebrandt, F. A., 52—ab, *502
Henriques, F. C., 538—ab
Henry, M. G., 58—ab
Herrmann, L. G., 538—ab
Highet, W. B., 538—ab
Hildenbrand, E. J. C., 441—ab
Hiller, F., 728—ab
Hines, E. G., Jr., 782—ab
Hines, H. M., 53—ab, *261
Hiss, J. G. F., 442—ab
Hoffman, H. V., 183—ab
Holmes, W., 538—ab
Holmquest, H. J., 310—ab
Hope-Gill, C. W., 378—ab
Hopkins, F., 665—ab
Horder, Lord, 312—ab
Horwitz, W. A., 248—ab
Howorth, M. B., 537—ab
Huddleston, O. L., 119—ab, 182—ab *197
Hundley, J. L., 378—ab

I

Ivy, A. C., 535—ab

J

Jackson, E. C. S., 782—ab
Jamison, Elizabeth, 537—ab
Jaqua, E. J., *404
Jarman, M. B., *153
Johnson, J. F., 183—ab
Johnson, R. E., 443—ab
Johnston, C. G., 377—ab
Johnston, C. H. P., 725—ab
Jones, C. W., *691
Jones, G. E., 121—ab
Jones, N., 378—ab

K

Kabat, H., *691
Kalb, S. W., 313—ab
Kalinowsky, L. B., 248—ab,
442—ab
Karpovich, P. V., 728—ab
Karsner, H. T., 535—ab
Katzenelbogen, S., 58—ab
Kendell, H. W., *8, *76, *329
Kennard, W. J., 602—ab
Kersley, G. D., 312—ab
Keys, A., *633
Keys, T. E., *549
Knapp, M. E. 497—d
Knight R. A., 442—ab
Knudson, A. B. C., 348—d,
*336
Kovács, R., *567, *613, *683
Kraus, H., 182—ab
Kross, I., 538—ab
Kruse, F. H., 441—ab, *549
Kuffler, S. W., 185—ab
Kuitert, J. H., *99

L

Lam, C. R., *20
Lancaster, W. B., 56—ab
Lanckenhau, Nellie I., 184—ab
Landis, E. M., 52—ab
Lange, K., 58—ab
Lee, R. I., 535—ab
Lesser, A., 727—ab
Lessler, M. A., 535—ab
Levine, M. I., 185—ab
Lippmann, R. K., 183—ab
Livermore, G. R., 183—ab
Lobachev, S. V., 666—ab, 727—ab
Love, J. G., 727—ab
Lowenstein, P. S., 445—ab
Luco, J. V., 183—ab

H

MacAusland, W. R., 54—ab
Marble, A., 186—ab
Martin, D. J., 57—ab
Mayfield, F. H., 446—ab
McClellan, W. S., 535—ab
McCullough, C., 781—ab

McDonald, R. H., 377—ab
McElvenny, R. T., 311—ab
McFarland, J. W., 52—ab,
498—d
McGuinness, Madge C. L.,
497—d
McIntosh, R., 535—ab
McLaughlin, H. L., 665—ab
McLean, Regina, 538—ab
McLoughlin, C. J., 779—ab
McMorris, R. O., *353
McQuarrie, I., 248—ab
Mendelssohn, K., 248—ab
Menville, J. G., 442—ab
Meyer, Otto, 378—ab
Milch, H., 444—ab
Miles, M., 443—ab
Miller, Elsie, *76
Milowsky, J. L., 376—ab
Mitchell, H. C., *227
Montgomery, H. H., *214
Moore, J. B., 311—ab
Moreira, M., 443—ab
Moritz, A. R., 538—ab

N

Neligan, A. R., 602—ab
Neller, J. L., 314—ab
Nelson, N., 374—ab
Nesbit, R. M., 780—ab
Newman, L. B., *762
Nickerson, J. L., 724—ab
Niedelman, M. L., *290
Nielsen, J. M., 57—ab
Nixon, J. W., 314—ab

O

Ober, F. R., 54—ab
Oliver, C. P., 248—ab

P

Palmer, L. J., 724—ab
Parker, F. P., 375—ab
Patterson, F. M., 376—ab,
445—ab
Pattle, R. E., 726—ab
Paul, W. D., *687
Peck, W. M., 728—ab
Pemberton, P. A., *282
Pemberton, R., *618, 374—ab
Pereyra, A. J., 782—ab
Perret, G., 728—ab
Pfeiffer, D. B., 376—ab,
445—ab
Pickerill, C. M., 781—ab
Pickerill, H. P., 781—ab
Piersol, G. M., *133
Pillaro, R. P., 724—ab
Piontovsky, I. A., 375—ab
Pollock, L. J., 666—ab, 728—
ab

Postlethwait, R. W., 375—ab
Pratt, L. R., *649
Pretty, H. G., 443—ab
Priorov, N. N., 314—ab
Proctor, L. D., 378—ab
Pruce, A. M., *23

Q

Quisling, S., 723—ab

R

Raines, O. M., 182—ab
Randall, G. C., 666—ab
Raney, R. B., 727—ab
Reidy, J. P., 312—ab
Reiger, A., *104, *267
Richards, R. L., 781—ab
Richter, C. P., 728—ab
Rodin, F. H., 56—ab
Rooks, R., 536—ab
Rose, D. L., *76, 442—ab
Rudin, L. N., 148—d
Rudolph, H. L., *703, *741
Ruffin, J. B., 120—ab
Rusk, H. A., *766
Ruskin, S. H., *168

S

Safford, F. K., *499
Schmidt, E. R., 314—ab
Schneider, L. V., 377—ab
Schoch, A. G., 185—ab
Schwartz, R. P., 55—ab
Schwartzmann, J. R., 443—ab
Schwemlein, G. X., *8, *329,
*582, *623
Scott, W., 779—ab
Scoville, W. B., 602—ab
Scull, C. W., *159
Scully, F. J., *233
Seddon, H. J., 538—ab
Shapiro, M. A., 120—ab
Shepler, J. R., 54—ab
Shields, C., 122—ab
Silbert, S., 779—ab
Simpson, W. M., *76
Smart, M., 311—ab
Smith, L. H., 313—ab
Smith, W. K., 55—ab
Snoke, A. W., 446—ab
Snow, W. B., 182—ab, *220
Speigel, I. J., 376—ab, 780—
ab
Speiser, M. D., 443—ab
Stasch, W. H., *361
Steggmann, A. T., *485, 498—
d
Stein, H. D., *272
Stephenson, Kathryn, *485
Stevens, D. S., 781—ab
Strange, St. Clair, F. G., 781—
ab

T

Tarsy, J. M., 312—ab
 Tegner, W. S., 537—ab
 Thomas, Atha, 57—ab
 Thomas, E. W., 55—ab, 554—
 ab
 Thomsen, P., 183—ab
 Thomson, J. D., *261
 Thorndike, A., 53—ab, 310—
 ab
 Thorsén, G., *638
 Turner, J. W. A., 313—ab

U

Ungley, C. C., 781—ab
 Urschel, D. L., 55—ab

V

Varga, C., 119—ab
 Vietz, H. R., 535—ab

Viswanathan, R., 376—ab
 Voldeng, K. E., *766

W

Walker, A. E., 378—ab
 Wallace, J., 57—ab
 Warren, S. L., 378—ab
 Watkins, A. L., *69, *325
 Weddell, G., 726—ab
 Weeden, W. M., *272
 Wehrmacher, W. H., *261
 Wells, A. G., 443—ab
 Wells, Mildred, 778—ab
 West, Catherine, *404
 Wexler, Gertrude, 55—ab,
 443—ab
 White, J. C., 602—ab
 White, J. W., 601—ab
 Wiley, B. C., *645, *764
 Wilkinson, L. H., 601—ab

Williams, J. R., Jr., 723—ab
 Willis, H. S., 728—ab
 Wilson, C. P., 444—ab
 Wilson, E. H., 121—ab, *349
 Wilson, G. D., *361
 Wilson, J. L., 374—ab
 Woodrue, B. G., 728—ab
 Wright, Jessie, 249—ab,
 497—d
 Wyllie, J., 726—ab

Y

Young, C. L., 54—ab
 Young, J. G., 445—ab
 Yudin, S. S., 250—ab

Z

Zeigler, M. L., 248—ab
 Zeiter, W. J., 535—ab

INDEX TO PAGES

Of the Archives, According to Monthly Issues—Volume XXVI, January-December, 1945

1—64	1.....January	385—480	7.....July
65—128	2.....February	481—546	8.....August
129—192	3.....March	547—608	9.....September
193—256	4.....April	609—672	10.....October
257—320	5.....May	673—736	11.....November
321—384	6.....June	737—800	12.....December

End

